INSTALLATION RESTORATION PROGRAM

PHASE I - RECORDS SEARCH

ENGLAND AFB, LOUISIANA

PREPARED FOR

UNITED STATES AIR FORCE
TACTICAL AIR COMMAND
Directorate of Engineering
and
Environmental Planning
Langley AFB, Virginia

ES ENGINEERING-SCIENCE

MAY 1983

NOTICE

This report has been prepared for the United States Air Force by Engineering-Science for the purpose of aiding in the implementation of the Air Force Installation Restoration Program. It is not an endorsement of any product. The views expressed herein are those of the contractor and do not necessarily reflect the official views of the publishing agency, the United States Air Force, nor the Department of Defense.

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Langley AFB, Virginia

May 1983

Prepared By

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26306

May 25, 1983

Mr. Gil Burnet
TAC/DEEV
Langley AFB, Virginia 23665

Dear Mr. Burnet:

Enclosed for your review is the Engineering-Science, Inc. (ES) final report entitled "Installation Restoration Program, Phase I Records Search, England Air Force Base, Alexandria, Louisiana. This report has prepared in accordance with U. S. Air Force Contract Number F33615-80-D-4001, Call Order 0038.

Presented in this report are introductory background information on the Installation Restoration Program, a description of the England Air Force Base (EAFB) Installation including past activities, mission and environmental setting, a review of industrial activities at EAFB, an inventory of major solid and hazardous waste from past activities, a review of past and present waste handling, treatment and disposal facilities, and an evaluation of the pollution potential of each identified site.

We appreciate the opportunity to work with you and the EAFB personnel who contributed information to us for the completion of this assessment.

Very truly yours,

ENGINEERING-SCIENCE, INC.

Gary Christopher

W. G. Christopher, P.E.
Project Manager

WGC/amr

Enclosure

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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

The Department of Defense (DOD) has developed a program to identify and evaluate past hazardous material disposal sites on DOD property, to control the migration of hazardous contaminants, and to control hazards to health or welfare that may result from these past disposal operations. This program is called the Installation Restoration Program (IRP). The IRP has four phases consisting of Phase I, Initial Assessment/Records Search; Phase II, Confirmation; Phase II, Technology Base Development; and Phase IV, Operations. Engineering-Science (ES) was retained by the Tactical Air Command to conduct the Phase I, Initial Assessment/Records Search at England AFB under Contract No. F33615-80-D-4001, Call Order 0038, using funding provided by the Tactical Air Command.

INSTALLATION DESCRIPTION

England Air Force Base is located in Central Louisiana approximately five miles west of Alexandria, Louisiana. The base was activated in 1939, deactivated in 1946 and reactivated in 1950. The main installation comprises 2613 acres of land. In addition, the Air Force owns or leases and operates three other areas supported by England AFB; Claiborne Air-to-Ground Range, Lake Charles Air Force Station, and Cotile Recreation Area. Claiborne Air-to-Ground Range is a 25,772 acre tract of land within the Kitsatchie National Forest approximately twelve miles south of the main base. Claiborne is used as an Air-to-Ground range.

The Lake Charles Air Force Station, previously under the jurisdiction of the decommissioned Lake Charles Air Force Base, is a 4.4 acre radar site located about 90 miles southwest of EAFB. The site is owned by the Air Force. Cotile Recreation Area, a 38-acre site leased by the Air Force, is located about 15 miles west of England AFB.

Since July 1972, the 23rd Tactical Fighter Wing, Tactical Air Command, has been the host unit on base. The 23rd Tactical Fighter Wing's mission has been to maintain a combat ready posture capable of worldwide deployment to bases and forward operating locations with minimum support facilities.

ENVIRONMENTAL SETTING

The environmental setting data reviewed for this investigation indicate the following major items that are relevant to the evaluation of past hazardous waste management practices at England Air Force Base and its satellite facilities:

- Surface soils of the England Air Force Base area are typically fine-grained silts and clays with generally low permeabilities, and possess shallow water levels (ten feet below ground surface or less).

- Surface soils of the Cotile Recreation Area, Claiborne Range and the Lake Charles Air Force Station are sandy, permeable and possess shallow water levels (estimated to be less than twenty feet).

- The primary regional aquifer underlies England Air Force Base at moderate depth (minimum 120 feet below ground surface). A shallow aquifer is present at or near ground surface which is in close communication with the Red River. The shallow aquifer is considered to be of limited significance in the study area. However, because of large scale pumpage conducted in some municipal well fields, recharge from the alluvium to the underlying regional aquifer may have been induced locally.

- Flooding is not normally a problem at England Air Force Base.

- The mean annual precipitation for the base is 56.9 inches and net precipitation is calculated to be eight inches.

- No indication of ground-water contamination was noted during the water-quality records search for Cotile, Claiborne or the main installation. Reportedly, a ground-water contamination problem does exist at the Lake Charles Air Force Station, but its source(s) is not considered to be related to station activities.

- The surface waters entering and exiting the base are considered to be of similar quality. England AFB activities do not not degrade stream water quality.

- No threatened or endangered species have been observed within the main England Air Force Base boundaries. Transient species may occasionally pass through the Cotile Recreation area or the Clairborne Air-to-Ground range. The Red-Cockaded Woodpecker is indigenous to Central Louisiana and is found on Claiborne Air-to-Ground ranges.

From these major points, it may be seen that potential pathways for the migration of hazardous waste-related contamination exist. If hazardous materials are present in or on the ground, they may encounter a shallow (water-table) aquifer and subsequently be discharged with base-flow to area surface waters. However, the potential for the migration of contamination to a major regional aquifer is considered to be unlikely, as it could only occur where flow has been artificially induced between the overdrawn regional aquifer and the shallow aquifer.

METHODOLOGY

During the course of this project, interviews were conducted with base personnel (past and present) familiar with past waste disposal practices; file searches were performed for past hazardous waste activities; interviews were held with local, state and federal agencies; and inspections were conducted at past hazardous waste activity sites. Twenty sites located on the England AFB property were identified as potentially containing hazardous materials resulting from past activities (Figure 1). These sites have been assessed using a Hazard Assessment Rating Methodology (HARM) which takes into account factors such as site characteristics, waste characteristics, potential for contaminant migration and waste management practices. The details of the rating procedure are presented in Appendix E and the results of the assessment are given in Table 1. The rating system is designed to indicate the relative need for follow-on action.

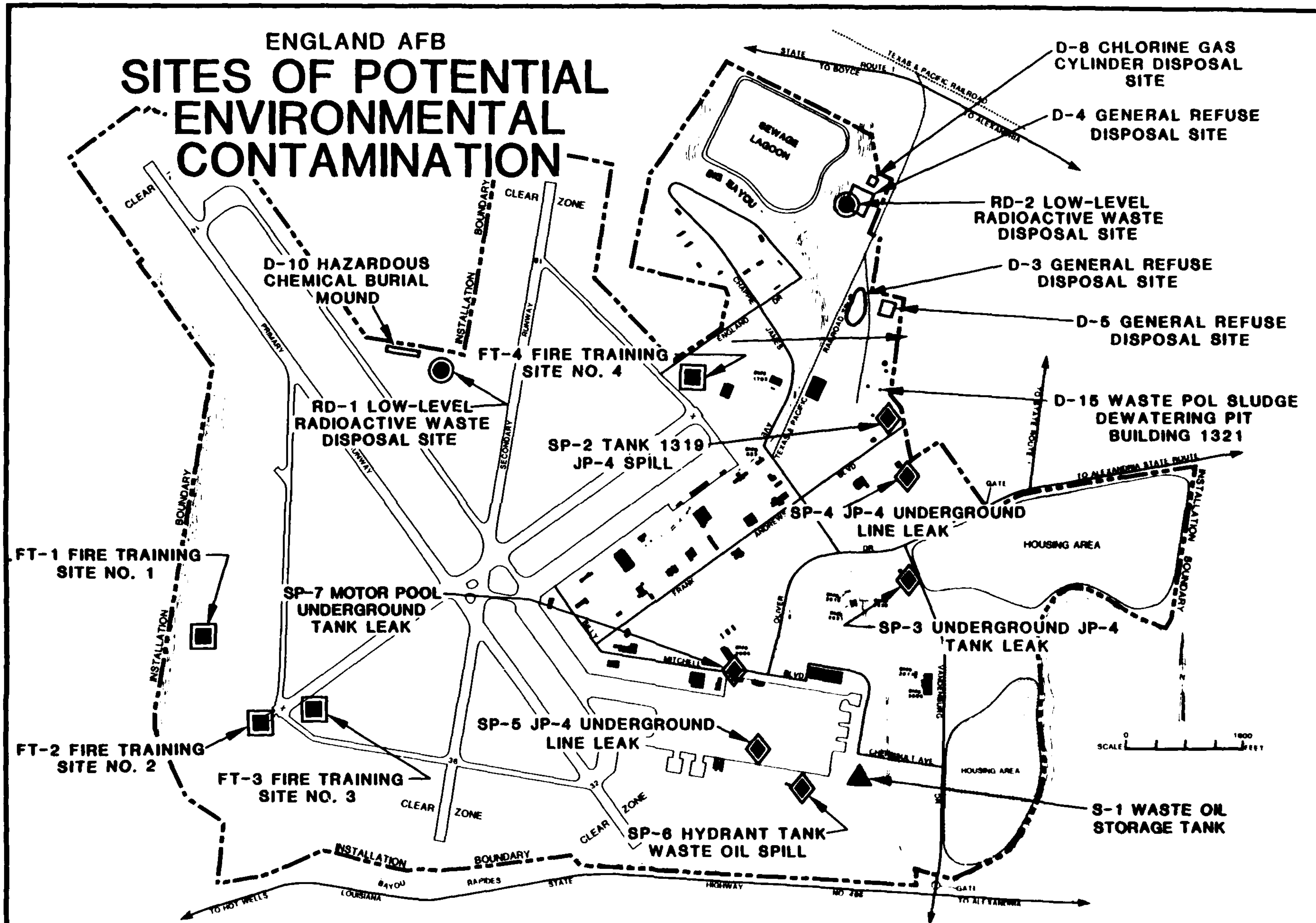
FINDINGS AND CONCLUSIONS

The following conclusions have been developed based on the results of the project team's field inspection, review of base records and files and interviews with installation personnel.

The areas determined to have a moderate potential for environmental contamination are as follows:

- Site FT-1, Fire Training Site No. 1
- Site D-15, POL Sludge Weathering Pit
- SP-4, JP-4 Underground Line Leak
- SP-5, JP-4 Underground Line Leak
- SP-6, CE Tank Spill
- SP-3, JP-4 Underground Tank Leak

FIGURE 1



ENGLAND AFB
SITES OF POTENTIAL ENVIRONMENTAL CONTAMINATION

SOURCE: ENGLAND AFB INSTALLATION DOCUMENTS

NOTE: SITE S-6 IS LOCATED AT LAKE CHARLES AIR FORCE STATION

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TABLE 1

PRIORITY RANKING OF POTENTIAL CONTAMINATION SOURCES

Rank	Site No.	Site Name	Date of Operation of Occurrence	Overall Total Score
1	FT-1	Fire Training Site No. 1	1940's - 1964	61
2	D-15	POL Sludge Weathering Pit	1950's - 1982	56
3	SP-4	JP-4 Underground Line Leak	1977 - 1978	53
4	SP-5	JP-4 Underground Line Leak	1981	53
5	FT-3	Fire Training Area No. 3	1966 - 1980	53
6	SP-3	JP-4 Underground Line Leak	1977 - 1978	52
7	SP-2	Tank 1319 JP-4 Spill	1969	52
8	S-1	Waste Oil Storage Tank	1965 - Mid 1970's	52
9	D-3	General Refuse Disposal Site	1950's	51
10	D-8	Chlorine Gas Cylinder Disposal Site	Early 1960's	50
11	D-10	Hazardous Chemical Burial Mound	1945 - 1946	50
12	S-6	Lake Charles Drum Storage Site	? - Present	49
13	FT-2	Fire Training Site No. 2	1964 - 1966	48
14	FT-4	Fire Training Site No. 4	1980 - 1982	48
15	D-4	General Refuse Disposal Site	Late 1950's - Early 1960's	48
16	D-5	General Refuse Disposal Site	Early 1960's - Mid 1960's	48
17	SP-6	CE Tank Spill	1970's - 1980's	46
18	SP-7	Motor Pool Underground Tank Leak	1976 - 1977	46
19	RD-1	Low-Level Radioactive Waste Disposal Site	1957 - 1958	37
20	RD-2	Low-Level Radioactive Waste Disposal Site	Unknown	35

The areas determined to have a low potential for environmental contamination are as follows:

- SP-2, Tank 1319 JP-4 Spill
- D-3, General Refuse Disposal Site
- D-8, Chlorine Gas Cylinder Disposal Site
- D-10, Hazardous Chemical Burial Mound
- FT-2, Fire Training Site No. 2
- FT-3, Fire Training Site No. 3
- FT-4, Fire Training Site No. 4
- D-4, General Refuse Disposal Site
- D-5, General Refuse Disposal Site
- RD-1, Low-Level Radioactive Waste Disposal Site
- RD-2, Low-Level Radioactive Waste Disposal Site

RECOMMENDATIONS

The detailed recommendations developed for further assessment of potential environmental contamination are presented in Section 6. The recommended actions are one-time sampling programs to determine if contamination does exist at the site. If contamination is identified, the sampling program may need to be expanded to further define the extent of contamination. The recommendations are summarized as follows:

- FT-1 Fire Training Site No. 1.

  Implement surface water and sediment monitoring adjacent to the old burn pit and collect and analyze soil boring samples from the fire training area.
- D-15 POL Sludge Weathering Pit.

  Conduct geophysical survey and implement sediment monitoring adjacent to the closed pit. If suggested by results of the geophysical monitoring, install ground-water monitoring wells.
- Spills Areas (SP-3, JP-4 Underground Tank Leak, SP-4, JP-4 Underground Line Leak, SP-5, JP-4 Underground Line leak, SP-6, CE Tank Spill).

  Conduct geophysical survey.

SECTION 1
INTRODUCTION

SECTION 1
INTRODUCTION

BACKGROUND AND AUTHORITY

The United States Air Force, due to its primary mission, has long been engaged in a wide variety of operations dealing with toxic and hazardous materials. Federal, state, and local governments have developed strict regulations to require that disposers identify the locations and contents of disposal sites and take action to eliminate the hazards in an environmentally responsible manner. The primary Federal legislation governing disposal of hazardous waste is the Resource Conservation and Recovery Act (RCRA) of 1976, as amended. Under Sections 3012 and 6003 of the RCRA, Federal agencies are directed to assist the Environmental Protection Agency (EPA) and state agencies to inventory past disposal sites and make the information available to the requesting agencies. To assure compliance with these hazardous waste regulations, DOD developed the Installation Restoration Program (IRP). The current DOD IRP policy is contained in Defense Environmental Quality Program Policy Memorandum (DEQPPM) 81-5, dated 11 December 1981 and implemented by Air Force message dated 21 January 1982. DEQPPM 81-5 reissued and amplified all previous directives and memoranda on the Installation Restoration Program. DOD policy is to identify and fully evaluate suspected problems associated with past hazardous contamination, and to control hazards to health and welfare that resulted from these past operations. The IRP will be the basis for response actions on Air Force installations under the provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, and clarified by Executive Order 12316.

PURPOSE AND SCOPE OF THE ASSESSMENT

The Installation Restoration Program has been developed as a four-phased program as follows:

Phase I - Initial Assessment/Records Search

Phase II - Confirmation

Phase III - Technology Base Development

Phase IV - Operations (Control Measures)

Engineering-Science (ES) was retained by the Tactical Air Command (TAC) to conduct the Phase I Records Search at England Air Force Base under Contract No. F33615-80-D-4001, Call Order 0038. This report contains a summary and an evaluation of the information collected during Phase I of the IRP. The land areas included as part of the England AFB study are as follows:

England AFB (Main Base)

Claiborne Air-to-Ground Range

Lake Charles Air Force Station

Cotile Recreation Area

The goal of the first phase of the program was to identify the potential for environmental contamination from past waste disposal practices at England AFB, and to assess the potential for contaminant migration. The activities that were performed in the Phase I study included the following:

- Reviewed site records
- Interviewed personnel familiar with past generation and disposal activities
- Inventoried wastes
- Determined quantities and locations of current and past hazardous waste storage, treatment and disposal
- Defined the environmental setting at the base
- Reviewed past disposal practices and methods
- Conducted field and aerial inspection
- Gathered pertinent information from federal, state and local agencies
- Assessed potential for contaminant migration.

Engineering-Science performed the on-site portion of the records search during December, 1982. The following core team of professionals were involved:

- J. R. Absalon, Hydrogeologist, BS Geology, 8 years of professional experience
- W. G. Christopher, Environmental Engineer and Project Manager, ME Environmental Engineering, 8 years of professional experience
- G. M. Gibbons, MS Environmental Engineering, 2 years of professional experience
- B. L. Thorpe, Chemist, BS Chemistry, 2 years of professional experience.

More detailed information on these individuals is presented in Appendix A.

METHODOLOGY

The methodology used in the England AFB Records Search began with a review of past and present industrial operations conducted at the base. Information was obtained from available records such as shop files and real property files, as well as interviews with past and present base employees from the various operating areas. Those interviewed included current and past personnel associated with the Civil Engineering Squadron, Bioenvironmental Engineering Services, Aircraft Generation Squadron, Equipment Maintenance Squadron and Fuels Management Branch. Experienced personnel from past tenant organizations were also interviewed. A listing of Air Force interviewees by position and approximate period of service is presented in Appendix I.

Concurrent with the base interviews, the applicable federal, state and local agencies were contacted for pertinent base related environmental data. The agencies contacted and interviewed are listed below as well as in Appendix I.

- U.S. Army Corps of Engineers, New Orleans District
- Louisiana Division of Water Pollution Control
- U.S. Geological Survey Water Resources Division, Lake Charles, Louisiana
- Louisiana Hazardous Waste Division
- U.S. Geological Survey Water Resources Division, Alexandria, Louisiana
- Alexandria Municipal Water Department, Alexandria, Louisiana
- U.S. Geological Survey District Office, Baton Rouge, Louisiana

- U.S. Environmental Protection Agency, Region IV, Atlanta, GA

The next step in the activity review was to determine the past management practices regarding the use, storage, treatment, and disposal of hazardous materials from the various operations on the base. Included in this part of the activities review was the identification of all known past disposal sites and other possible sources of contamination such as spill areas.

A general ground tour and a helicopter overflight of the identified sites were then made by the ES Project Team to gather site-specific information including: (1) visual evidence of environmental stress; (2) the presence of nearby drainage ditches or surface water bodies; and (3) visual inspection of these water bodies for any obvious signs of contamination or leachate migration.

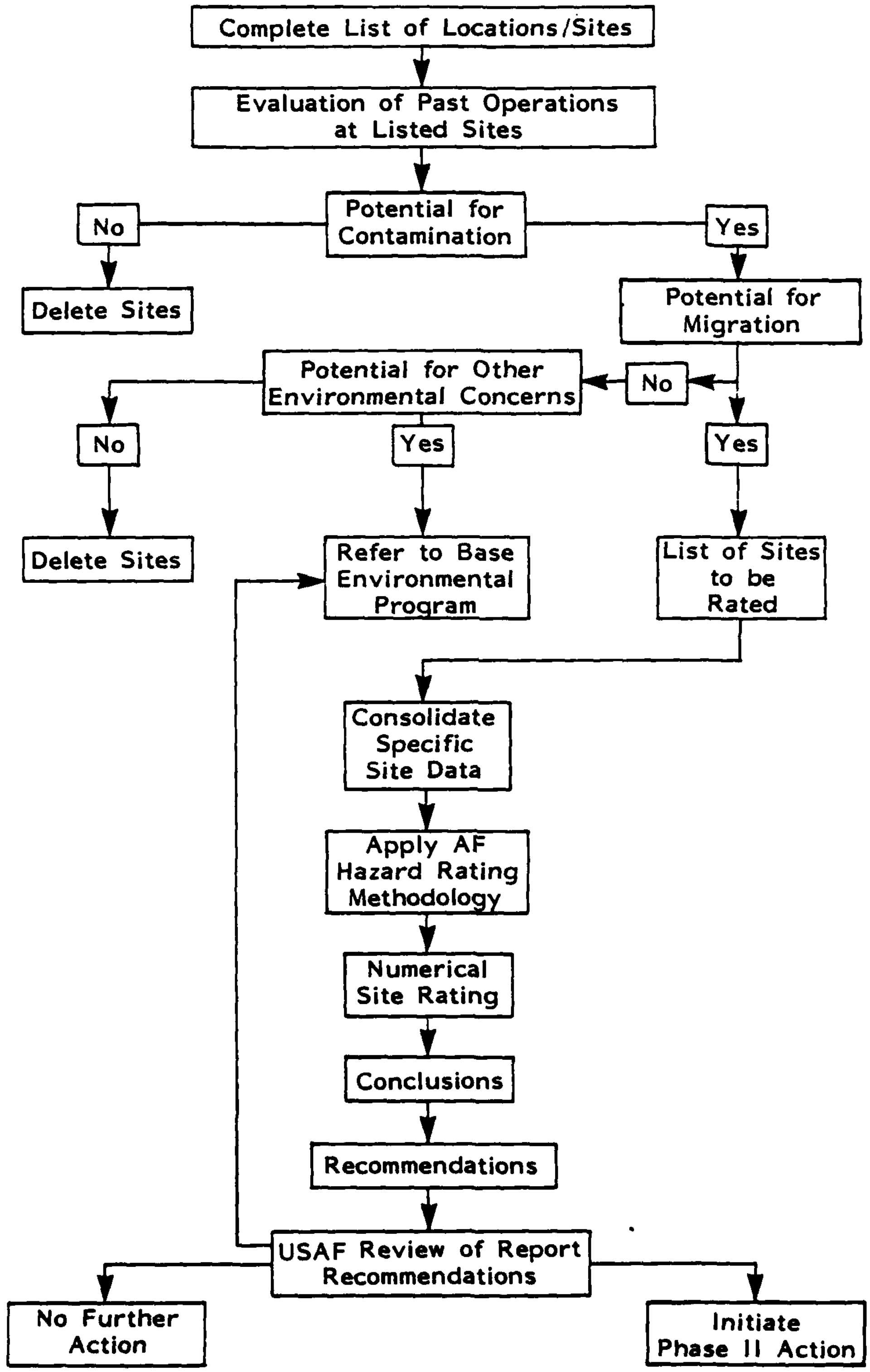
A decision was then made, based on all of the above information and using the Decision Tree shown in Figure 1.1, whether a potential exists for hazardous material contamination at any of the identified sites. If no potential existed, the site was deleted from further consideration. For those sites where a potential for contamination was identified, a determination of the potential for migration of the contamination was made by considering site-specific conditions. If there were no further environmental concerns, then the site was deleted. If the potential for contaminant migration was considered possible, then the site was evaluated and prioritized using the Hazard Assessment Rating Methodology (HARM). Appendix E contains a description of the HARM.

The HARM score indicates the relative potential for environmental contamination at each site. For those sites showing a high potential, recommendations are made to quantify the potential contaminant migration problem under Phase II of the Installation Restoration Program. For those sites showing a moderate potential, a limited Phase II program is recommended to confirm that a contaminant migration problem does or does not exist. For those sites showing a low potential, no further follow-on Phase II work is recommended.

FIGURE 1.1

PHASE I INSTALLATION RESTORATION PROGRAM

DECISION TREE



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SECTION 2
INSTALLATION DESCRIPTION

SECTION 2

INSTALLATION DESCRIPTION

LOCATION, SIZE AND BOUNDARIES

England Air Force Base (EAFB) is located in Central Louisiana approximately five miles west of Alexandria, Rapides Parish, Louisiana (Figures 2.1 and 2.2). The base lies within the relatively flat Red River Valley. The main installation comprises 2613 acres of total land (Figure 2.3) with a base population, including military and civilian family members, of more than 8,000 people. The total land area is divided approximately as follows:

Owned:	2,613 acres
Leased:	11 acres
Easement:	255 acres

In addition, the Air Force owns or leases and operates three other areas supported by England AFB; Claiborne Range, Lake Charles Air Force Station, and Cotile Recreation Area. Claiborne Range is a 25,972 acre tract of land within the Kitsatchie National Forest, approximately twelve miles south of the main base (Figure 2.4). This site, held under special use permit from the U.S. Forest Service, is used as an air-to-ground range. Camp Claiborne was part of this tract of land during World War II.

The Lake Charles Air Force Station, previously under the jurisdiction of the decommissioned Lake Charles Air Force Base (Chennault Air Force Base), is a 4.4 acre radar site located about 90 miles southwest of EAFB (Figures 2.1, 2.2 and 2.5) and approximately 3 miles southeast of Lake Charles. This site is owned by the Air Force. The Cotile Recreation Area, a 38-acre site leased by the Air Force, is located about 15 miles west of England AFB.

FIGURE 2.1

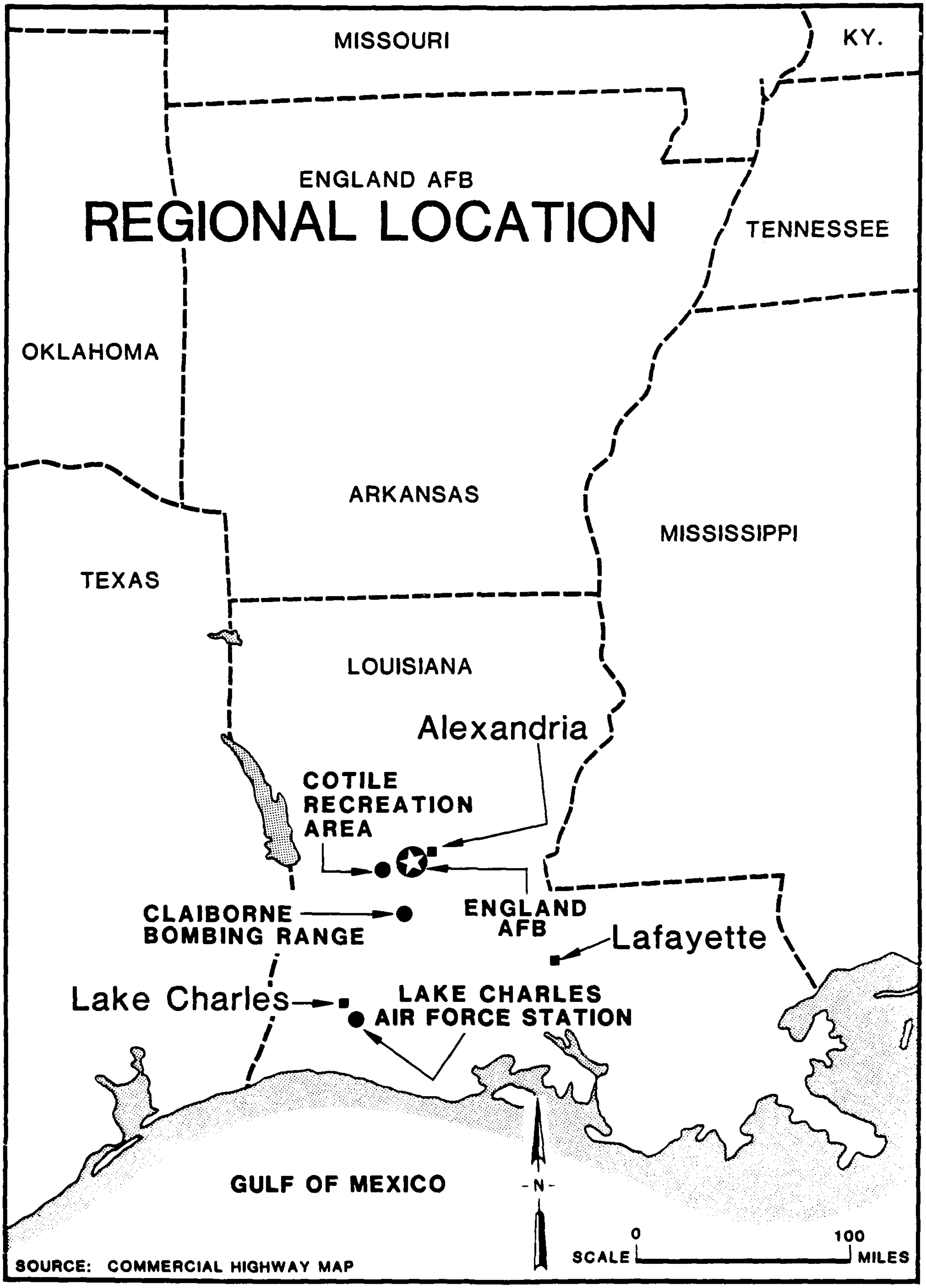

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FIGURE 2.2

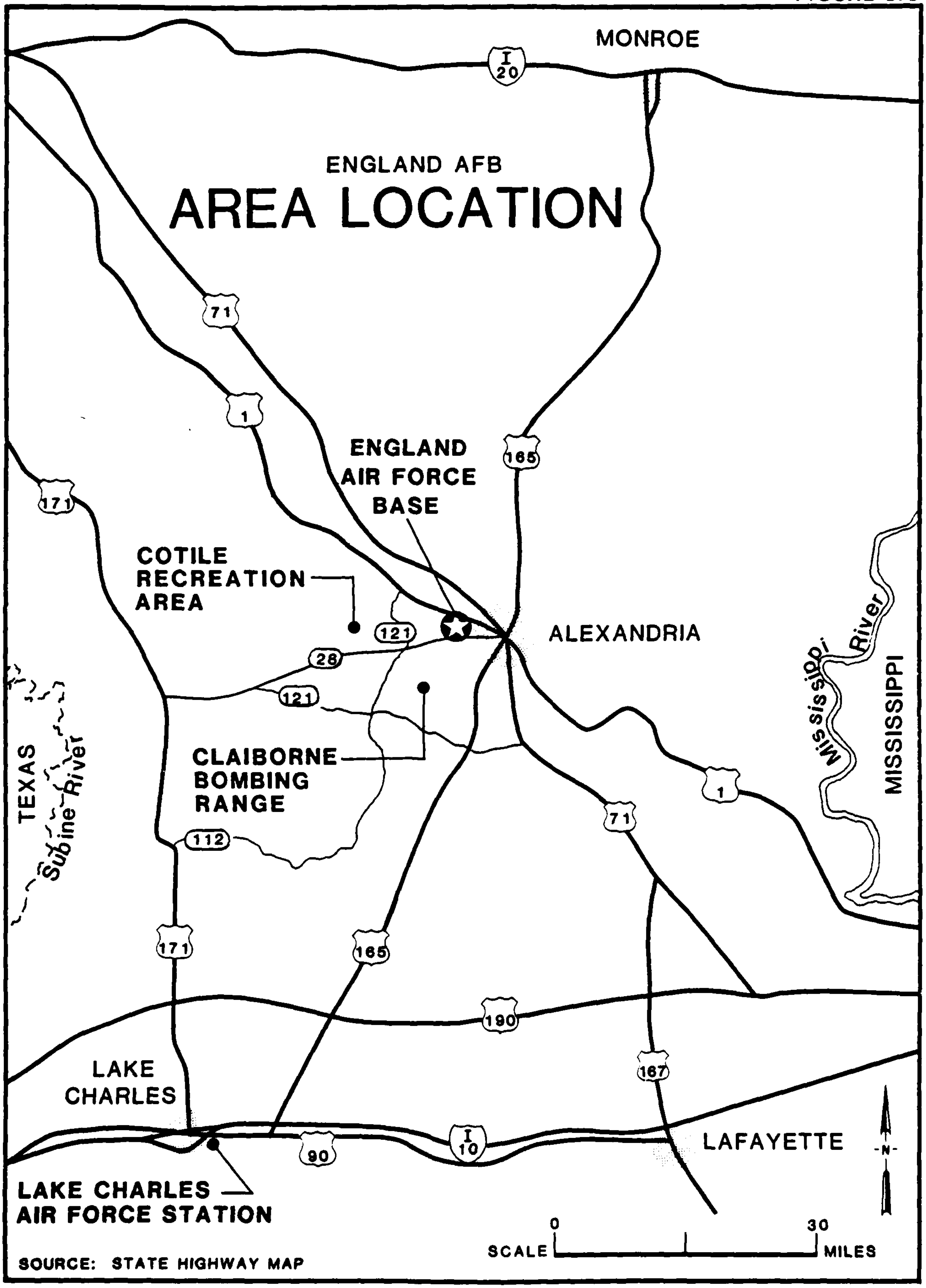

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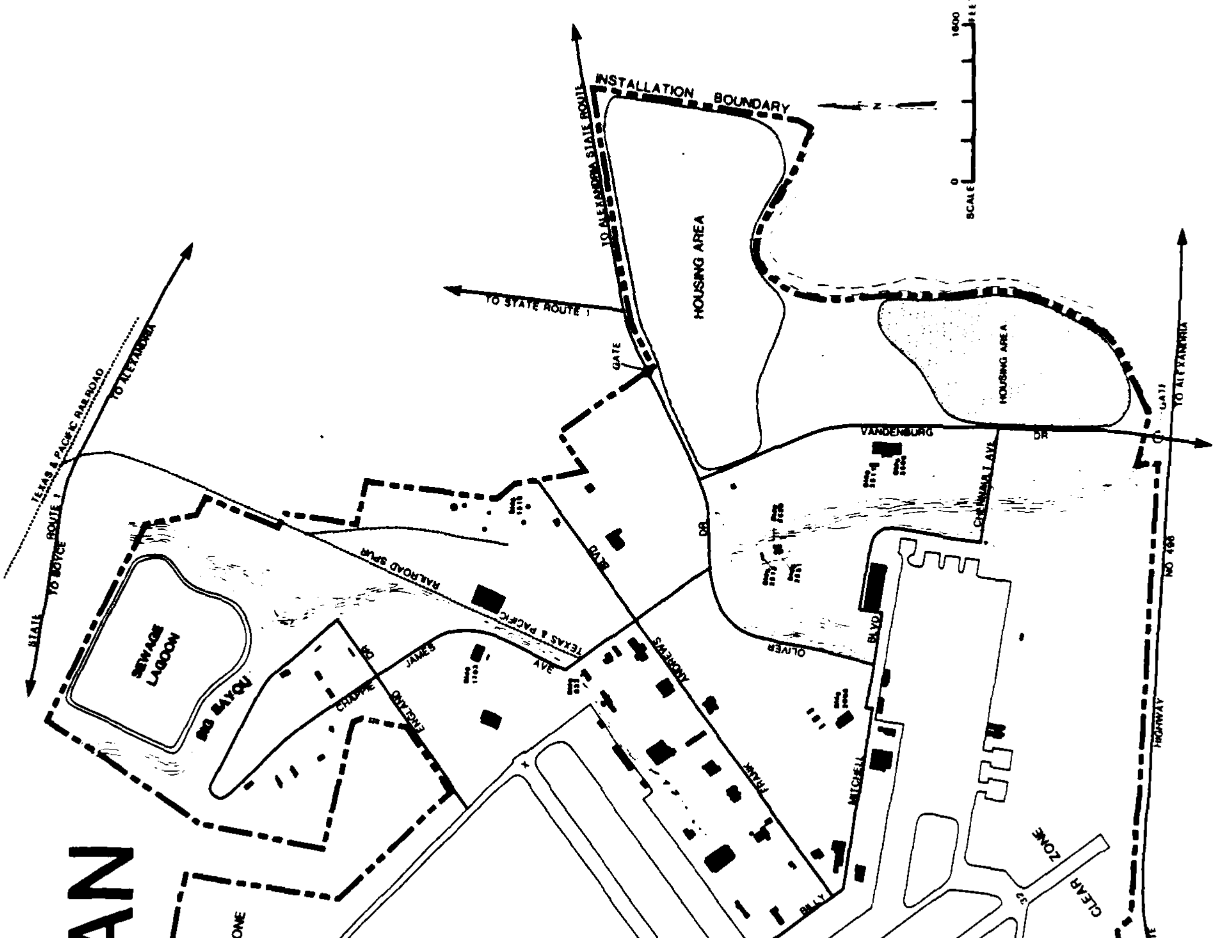
FIGURE 2.3

ENGLAND AFB

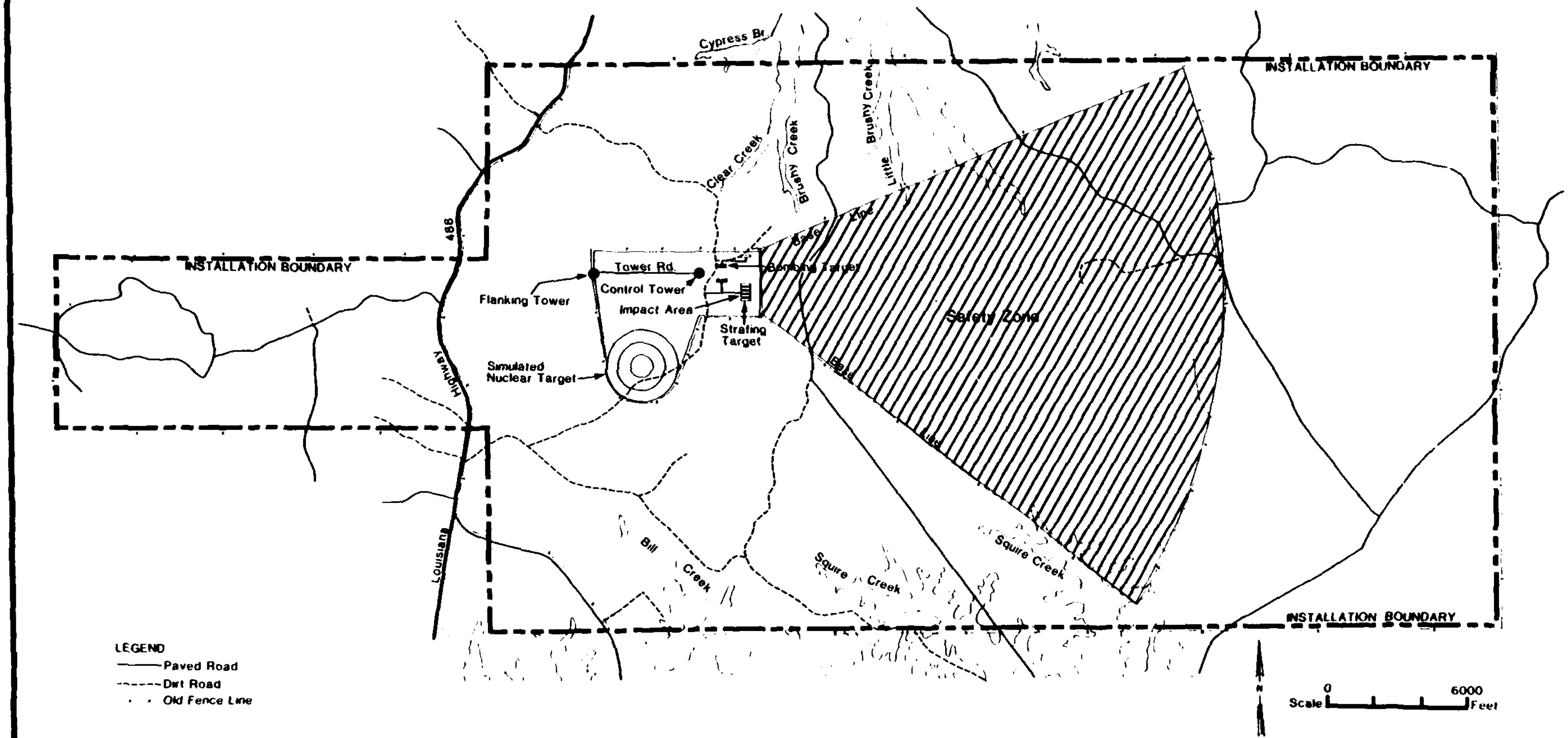
SITE PLAN



SOURCE: ENGLAND AFB INSTALLATION DOCUMENTS

FIGURE 2.4

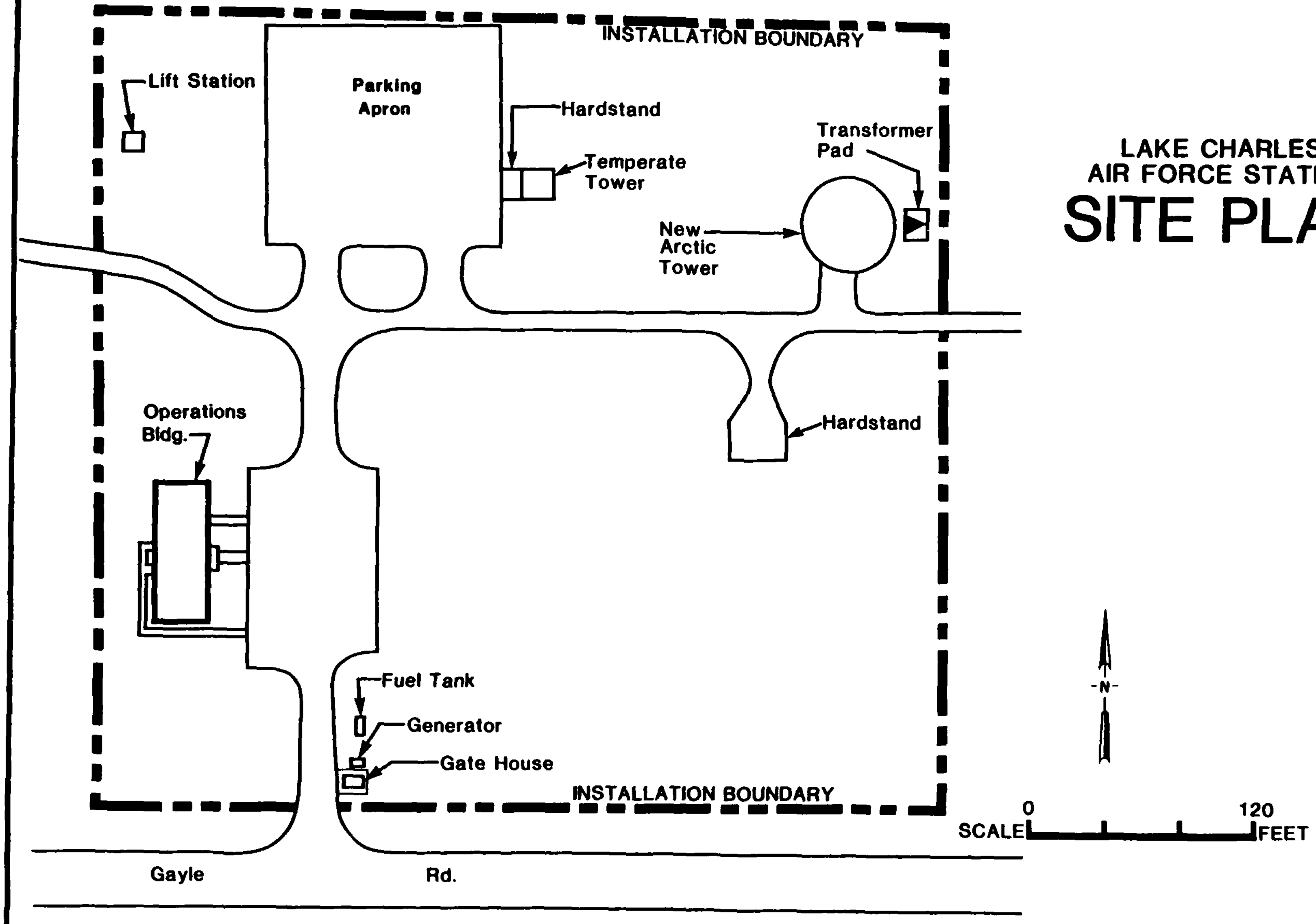
CLAIBORNE AIR-TO-GROUND RANGE
SITE PLAN



SOURCE: ENGLAND AFB INSTALLATION DOCUMENTS

FIGURE 2.5

LAKE CHARLES AIR FORCE STATION
SITE PLAN



SOURCE: ENGLAND AFB INSTALLATION DOCUMENTS

INSTALLATION HISTORY

The site now occupied by England AFB was originally opened for use in 1942 as Alexandria Army Air base. Until 1945, the facility was used as a B-17 bomber combat crew training school. After the cessation of hostilities in Europe in 1945, the facility was used to train B-29 bomber flight crews for duty in the Pacific. However, this mission did not last long, as the war with Japan ended later that year. Early in 1946, the base was placed on standby status, eventually being turned over to the city for use as a municipal airport. With the outbreak of the Korean War, the base was reactivated as Alexandria Air Force Base in 1950. That same year, it was assigned to Tactical Air Command. In June 1955, the base was officially named England Air Force Base.

Since its reopening, England AFB has been the home of many different aircraft with widely varying missions. When reopened, the primary unit was the F-84's. It has since been home for various TAC units flying aircraft such as the F-80, T-33, F-86, C-47, C-123, F-100 and A-37.

Since July 1972, the 23rd Tactical Fighter Wing, Tactical Air Command, has been the host unit on base. The 23rd TFW is currently equipped with the Fairchild Republic A-10 Thunderbolt II aircraft.

ORGANIZATION AND MISSION

The 23rd Tactical Fighter Wing's mission has been to maintain a combat ready posture capable of worldwide deployment to bases and forward operating locations with minimum support facilities. It conducts close air support, joint anti-armor operations, battlefield interdiction, search and rescue missions, employment conventional munitions (including AGM-65 Maverick missiles) against surface targets.

The following major tenant organizations are located at EAFB:

<u>Area Defense Council</u>

The office of the Area Defense Council is an operating location of Headquarters Air Force Trial Judiciary.

<u>Defense Investigative Service (DIS)</u>

The DIS conducts personal security investigations by appropriate DOD components.

Defense Property Disposal Office

The Defense Property Disposal Office (main site) is located at the U.S. Army's Fort Polk, LA, some 60 miles from England Air Force Base. This office receives, segregates, inspects, classifies and stores excess, surplus and scrap property, and hazardous waste turned in by all organizations at England Air Force Base and other activities in this geographic location. Property is disposed of by reutilization, transfer, donation, sale or destruction. An off-site branch (OSB), Site E of the DPDO, is located at England Air Force Base and handles the disposition of the above materials generated at England AFB.

Detachment 4, 4400th Management Engineering Squadron (TAC)

Detachment 4, 4400th Management Engineering Squadron, is a Tactical Air Command unit which provides manpower management support to the base.

Detachment 5, 3rd Weather Squadron (MAC)

Detachment 5, 3rd Weather Squadron, is a Military Airlift Command unit. It provides weather services for the 23rd Tactical Fighter Wing and all aircrews transiting the base.

Detachment 6, 507th Tactical Air Control Wing (TAC)

A unit of Tactical Air Command's 507th Tactical Air Control Wing at Shaw Air Force Base, SC., Detachment 6, represents the tactical air control system at England Air Force Base. The unit is responsible for the liaison between USAF and U.S. Army in direct support of ground forces and controlling coordination of tactical air support for joint air-to-ground operations.

Detachment 31, 5th Weather Squadron (MAC)

Detachment 31, 5th Weather Squadron, Military Airlift Command provides weather services for the U.S. Army's 5th Infantry Division (Mechanized) at Fort Polk, LA.

Detachment 309, 3785th Field Training Group (ATC)

Detachment 309 is an Air Training Command unit of the 3785th Field Training Group at Sheppard Air Force Base, Texas. It provides technical training in aircraft maintenance and other Air Force specialties at England Air Force Base.

Detachment 810, Air Force Office of Special Investigations

Detachment 810, Air Force Office of Special Investigations, provides professional investigative services, upon request, to commanders of all Air Force activities under the criminal, fraud and counterintelligence areas. AFOSI functions only as a fact-finding agency.

1908th Communications Squadron (AFCC)

The 1908th Communications Squadron is a unit of the Air Force Communications Command. Operating under the Tactical Communications Area, it provides base communications, air traffic control and communications-electronics maintenance to the 23rd Tactical Fighter Wing, all tenant organizations and to many agencies in the Central Louisiana area.

Operating Location AD, 678th Air Defense Group (TAC)

Operating Location AD of Tactical Air Command's 678th Air Defense Group at Tyndall Air Force Base, Fla., is located at Lake Charles Air Force Station, LA. The station is located approximately 90 miles southwest of the England Air Force Base.

Although physically separated from England Air Force Base, the seven Air Force members manning the unit are supported by the base. Operating Location AD is a radar station which supports the air defense of the Gulf area.

U.S. Navy Construction Office

The U.S. Navy Construction Office is part of the Southern Division of the Navy Facilities Engineering Command at Charleston Naval Base, S.C. This office inspects and handles all major military construction projects on England Air Force Base.

USAF Hospital

The hospital provides base medical services, which may include specialized treatment, for the military community and other authorized personnel.

Air Force Commissary Services

This tenant provides commissary services to England AFB.

SECTION 3
ENVIRONMENTAL SETTING

SECTION 3

ENVIRONMENTAL SETTING

The environmental setting of England Air Force Base (EAFB) is described in this section with the primary emphasis directed toward identifying features that may facilitate the movement of hazardous waste contaminants from the installation. Environmentally sensitive conditions pertinent to this study are highlighted at the end of this section.

METEOROLOGY

Temperature, precipitation, snowfall and other relevant climatic data furnished by Detachment 5, 3rd Weather Squadron, England Air Force Base are presented as Table 3.1. The indicated period of record is 28 years. The summarized data indicate that mean annual precipitation is 56.9 inches. On the basis of National Oceanographic and Atmospheric Administration data (NOAA, 1977), net precipitation for the Alexandria area is calculated to be eight inches.

GEOGRAPHY

The Alexandria area lies within the Red River Valley subdivision of the West Gulf Coastal Plain physiographic province. The valley land surface typically appears level to gently sloping. Area streams have developed nearly level, broad flood plains. The most prominent visual features of the region consist of the dissected terraces flanking the valley, which are the remnants of former flood plains (Newcome, 1960). Figure 3.1 depicts the project location within the Red River Valley.

TOPOGRAPHY

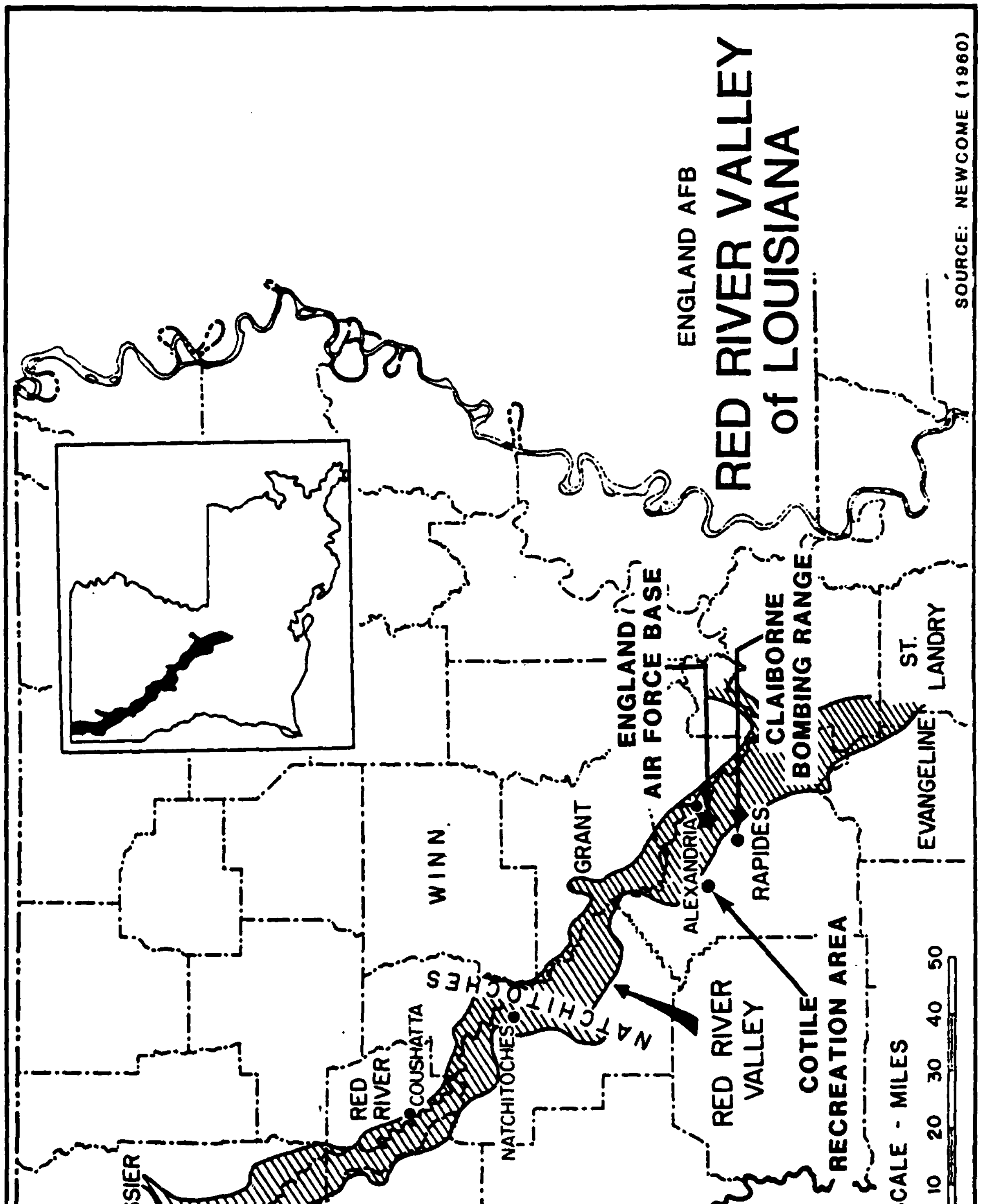
Valley elevations range from 40 feet above sea level in Avoyelles Parish to 205 feet in Caddo Parish. Outside the valley, at Flatwoods in Rapides Parish, surface elevations reach a maximum of 310 feet MSL.

TABLE 3.1
ENGLAND AIR FORCE BASE CLIMATIC DATA
PERIOD OF RECORD APRIL 1952 - NOVEMBER 1980

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
TEMPERATURE(°F)													
Average Daily Max	58	62	69	77	84	90	92	92	87	79	68	61	77
Average Daily Min	39	42	49	57	64	70	73	72	68	55	47	41	56
Average Monthly	48	52	59	67	74	80	83	82	78	67	58	51	67
Record Max	82	86	88	92	98	102	104	105	100	96	87	82	105
Record Min	10	18	24	31	44	55	57	57	36	30	22	12	10
PRECIPITATION (IN)													
Monthly Average	5.3	4.7	5.2	5.0	5.6	3.8	4.9	4.1	3.9	3.9	4.5	6.0	56.9
Monthly Maximum	13.0	10.1	15.6	13.2	17.2	11.8	11.2	11.3	11.4	11.0	10.8	12.6	17.2
Monthly Minimum	1.2	.8	.4	.8	1.5	.7	.4	.4	.6	.6	.1	1.8	1.8
Maximum - 24 hours	4.8	3.8	5.0	10.2	4.2	5.6	3.6	7.2	5.6	7.9	3.9	5.6	10.2
SNOWFALL (IN)													
Monthly Average	1	1	1	0	0	0	0	0	0	0	0	0	1
Monthly Maximum	3	9	1	0	0	0	0	0	0	0	0	0	9
Maximum - 24 hours	3	5	1	0	0	0	0	0	0	0	0	0	5

Source: Detachment 5, 3rd Weather Squadron, EAFB

FIGURE 3.1



ENGLAND AFB
RED RIVER VALLEY
of LOUISIANA
SOURCE: NEWCOME (1960)
ENGLAND AIR FORCE BASE
CLAIBORNE BOMBING RANGE
ST. LANDRY
EVANGELINE
RAPIDES
ALEXANDRIA
GRANT
WINN
NATCHITOCHES
RED RIVER VALLEY
COTILE RECREATION AREA
RED RIVER
COUSHATTA
BOSSIER
CADDO
SHREVEPORT
DE SOTO
SCALE - MILES
10 0 10 20 30 40 50

Rapides Parish relief is greatest at the Kisatchie Hills, where it approaches 100 feet.

At England Air Force Base, surface elevations vary from 75 feet MSL in the drainage channel adjacent to the golf course, to 90 feet MSL along the west installation boundary (installation documents). Local relief is seldom more than five feet and normally occurs as a gentle slope. The greatest apparent variations in installation relief may be observed along major water courses, such as Bayou Rapides.

DRAINAGE

Drainage of installation areas is accomplished by overland flow to diversion structures and then area surface streams: Big Bayou on the north side of the installation and by Bayou Rapides, which forms the south base boundary. Area streams flow in a generally eastward direction, terminating at the Red River. Near stream areas are usually characterized by natural levees, backwater swamps and seasonally flooded zones. Major area streams such as Bayou Rapides are isolated from the Red River during high stages by flood gates, in order to protect interior lowlands. According to U.S. Corps of Engineers Data, England AFB is not within a 100-year flood zone. No wetlands have been identified on base. Figure 3.2 depicts installation drainage features.

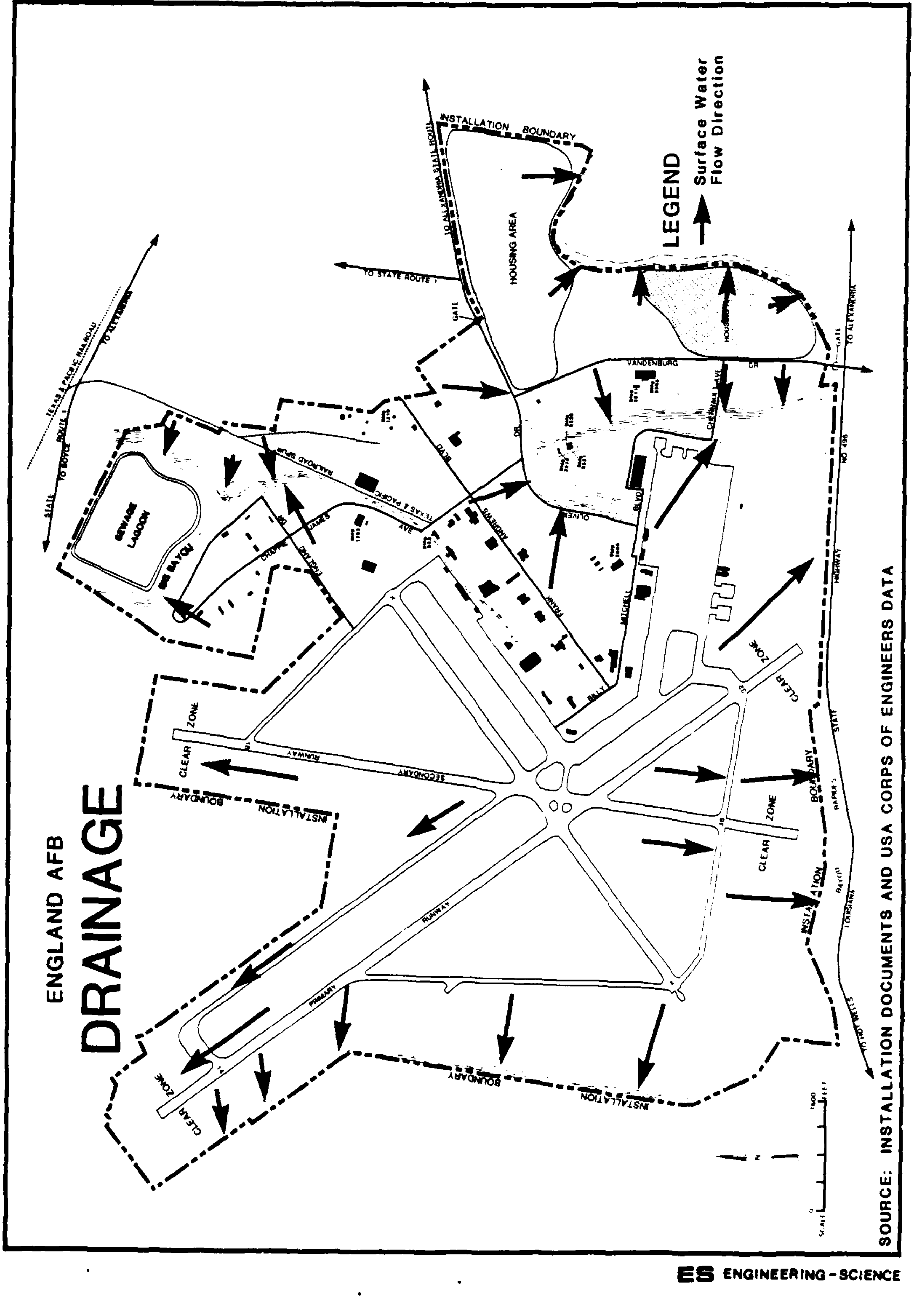
Surface Soils

Surface soils of the England Air Force Base project area have been mapped by the USDA Soil Conservation Service (1980). Three soil units have been identified within installation boundaries. The individual units are described in Table 3.2 and are mapped as Figure 3.3. All base soil units impose moderate to severe constraints on the development of waste disposal facilities. These soils are typically fine-grained, possess low permeabilities and poor internal drainage characteristics, and have shallow water tables.

GEOLOGY

Information describing the geologic setting of England Air Force Base has been obtained from Whittemore (1929), Fisk (1940), Woodward and Gueno (1941) and Frink (1941). Additional information has been obtained from interviews with U. S. Geological Survey (USGS) personnel. A brief

FIGURE 3.2



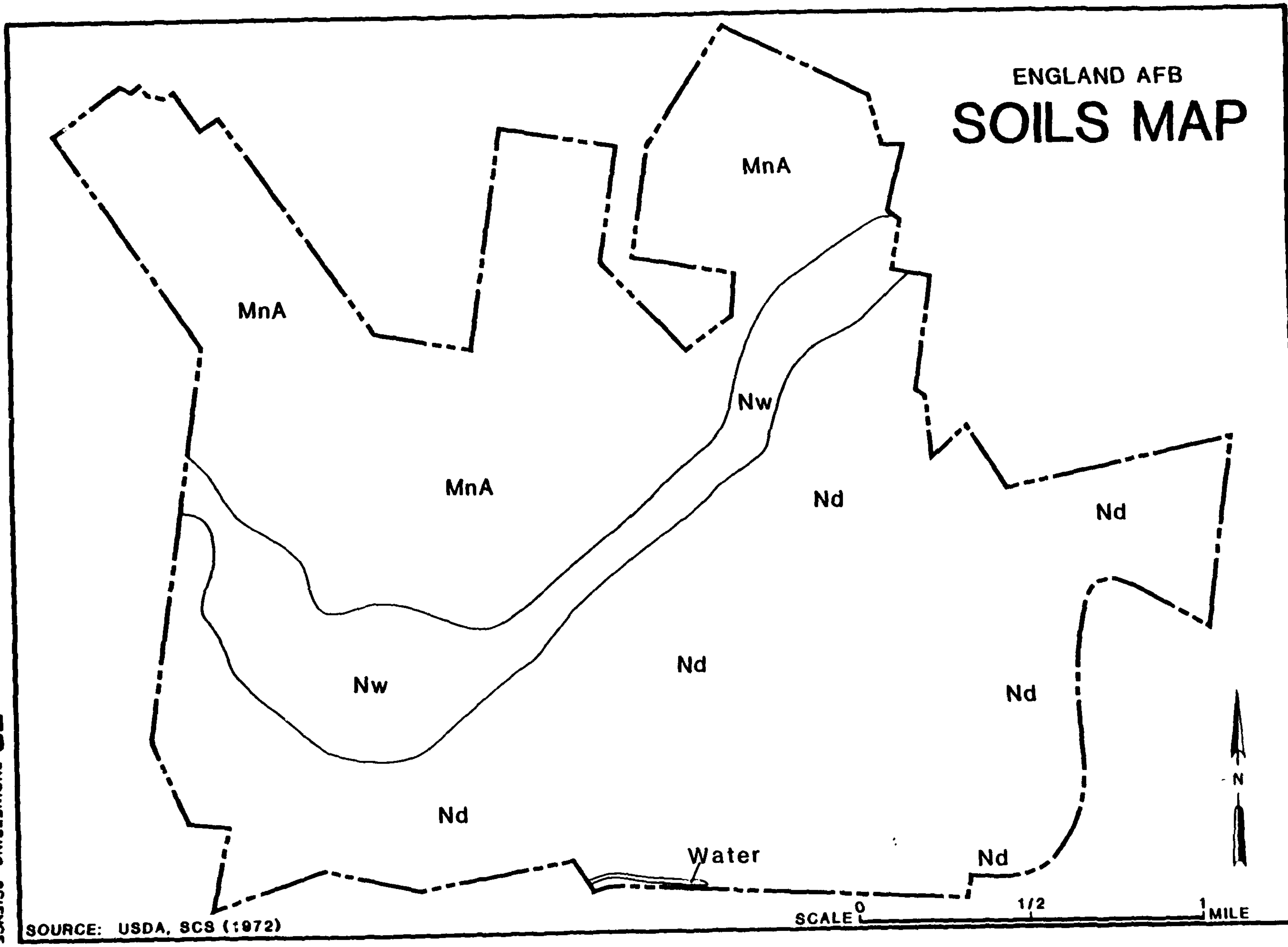
SOURCE: INSTALLATION DOCUMENTS AND USA CORPS OF ENGINEERS DATA

TABLE 3.2
ENGLAND AIR FORCE BASE SOILS

Map Symbol	Unit Description	USDA Texture (major fraction)	Thickness (inches)	Unified Classification (major fraction)	Permeability (inches/hour)	Disposal Site Facility Use Constraints
Mna	Moreland clay, 0-1% slopes	Clay, silty clay, silty clay loam	64	CH, CL	0.06 - <0.2	Severe - wetness (high water table)
Nd	Norwood silt loam	Silt loam, silty clay loam, fine sandy loam	76	ML, CL, CL-ML	0.6-2.0	Moderate - seasonably high water table
Nw	Norwood silty clay loam	Silty clay loam, silt loam, fine sandy loam	76	CL, ML, CL-ML	0.6-2.0	Moderate - seasonably high water table

Source: USDA, Soil Conservation Service (1980).

FIGURE 3.3



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review of their work with pertinent comments have been summarized to support this investigation.

Regional Geology

Geologic units ranging in age from Paleocene to Recent have been identified as significant to subsurface investigations in the project area. They repose on a Cretaceous surface that dips gently southward. These units consist of unconsolidated materials including clay, silt, sand, gravel, marl and consolidated units of shale and sandstone (Newcome, 1960). Table 3.3 summarizes post-Cretaceous geologic formations and describes their significant characteristics, in chronological order.

Stratigraphy and Distribution

The surface distribution of major geologic units is presented as Figure 3.4, which is modified from the work of Rollo (1960). Generally, the geology of England Air Force Base is dominated by a moderately thick section of alluvium overlying Miocene strata.

The alluvium, occupying the Red River Valley (and flood plain), consists of clay, silt and sand with some local accumulations of gravel. The unit reaches an approximate maximum thickness of 120 feet at USGS well R-1148, and is generally poorly sorted (segregated according to grain size). Coarser materials are present at depth within the unit and tend to fine upwards. Alluvial materials present at England Air Force Base have been described by soil borings conducted in support of geotechnical (foundation design) investigations. Boring logs indicate that shallow (less than fifteen feet deep below ground surface) alluvial soils are predominantly silts, clays and sandy silts. Ground water was encountered by the boring at depths below ground surface ranging from six to eleven feet. Figures 3.5 and 3.6 are the logs of two representative test borings drilled at England Air Force Base.

Immediately underlying the alluvium are deposits of Miocene Age, which consist primarily of unconsolidated sediments (i.e., clay, silt, sand, gravel) and some consolidated materials (usually shales). Units of Miocene age have a total thickness of some 500 feet in northwest Rapides Parish and thicken substantially to 5300 feet in the Southeast corner of the parish.

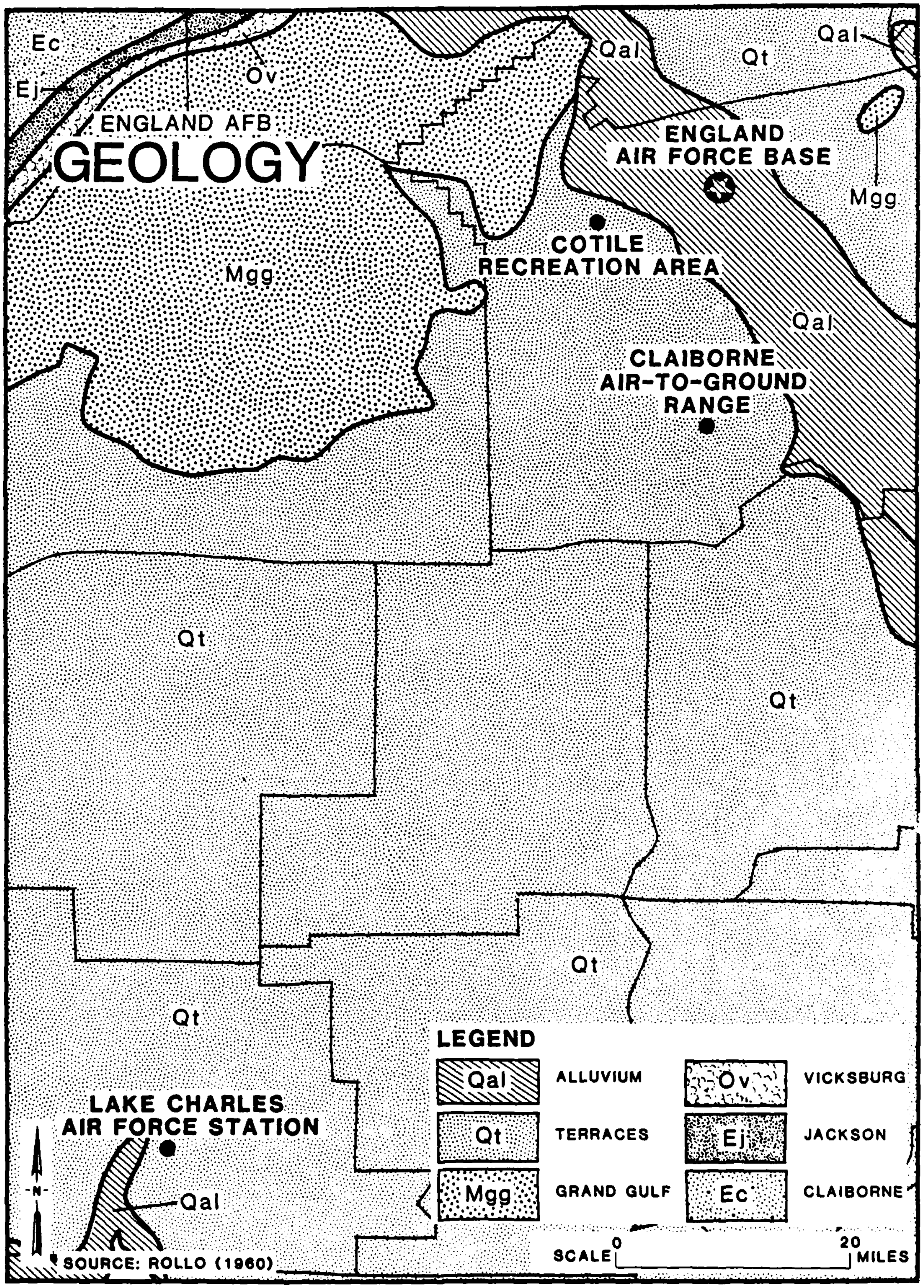
TABLE 3.3

GENERALIZED POST-CRETACEOUS STRATIGRAPHIC COLUMN FOR LOUISIANA

Era	System	Series	Group	Formation	Lithology and water-bearing characteristics.
Cenozoic	Quaternary	Pleistocene and Recent		Alluvium & Terrace	Clay, sand, and gravel. Permeable deposits yield large quantities of water, which generally is hard. Yields of wells are as much as 6,000 gpm.
Cenozoic	Tertiary	Pliocene			Clay and sand. Sands yield moderate to large quantities of soft water, as much as 3,200 gpm.
Cenozoic	Tertiary	Miocene			Clay and sand. Sands yield moderate to large quantities of soft water. Wells tapping thick saturated sections may yield 1,500 gpm or more.
Cenozoic	Tertiary	Oligocene	Vicksburg		Carbonaceous shale and clay, and marl. Silt and very fine sand in the outcrop areas yield small quantities of water locally. Generally not considered water bearing.
Cenozoic	Tertiary	Eocene	Jackson		
Cenozoic	Tertiary	Eocene	Claiborne	Cockfield	Clay and sand. Sands yield moderate quantities of water, which ranges from soft to very hard.
Cenozoic	Tertiary	Eocene	Claiborne	Cook Mountain	Clay and marl. Generally not water bearing.
Cenozoic	Tertiary	Eocene	Claiborne	Sparta sand	Sand and clay. Sands yield large quantities of soft water, as much as 2,000 gpm.
Cenozoic	Tertiary	Eocene	Claiborne	Cane River	Clay and marl. Generally not water bearing. Interpretation of electrical logs of oil-test wells indicate that a sandy facies in northern Caddo and Bossier Parishes contains fresh wa
Cenozoic	Tertiary	Eocene / Paleocene	Wilcox		Clay and sand. Sands yield small to moderate quantities of fresh water of variable quality. Water may be saline locally. Yields of wells may be as much as 500 gpm.
Cenozoic	Tertiary	Paleocene	Midway		Clay and shale. Not considered water bearing.

SOURCE: ROLLO (1960)

FIGURE 3.4



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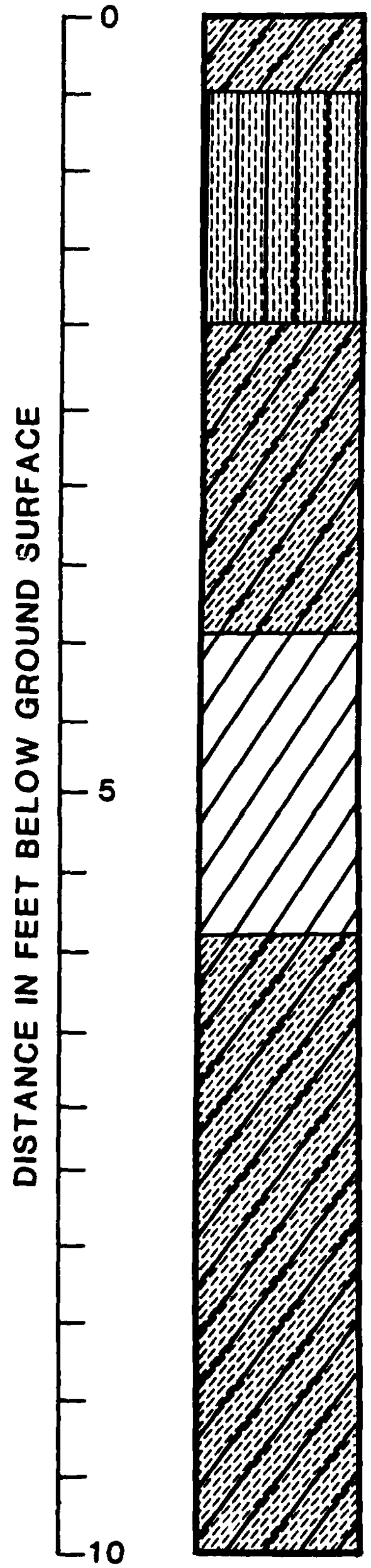
ENGLAND AFB

LOG OF TEST BORING NO. 6

(Refer to location shown on Figure 3.8)

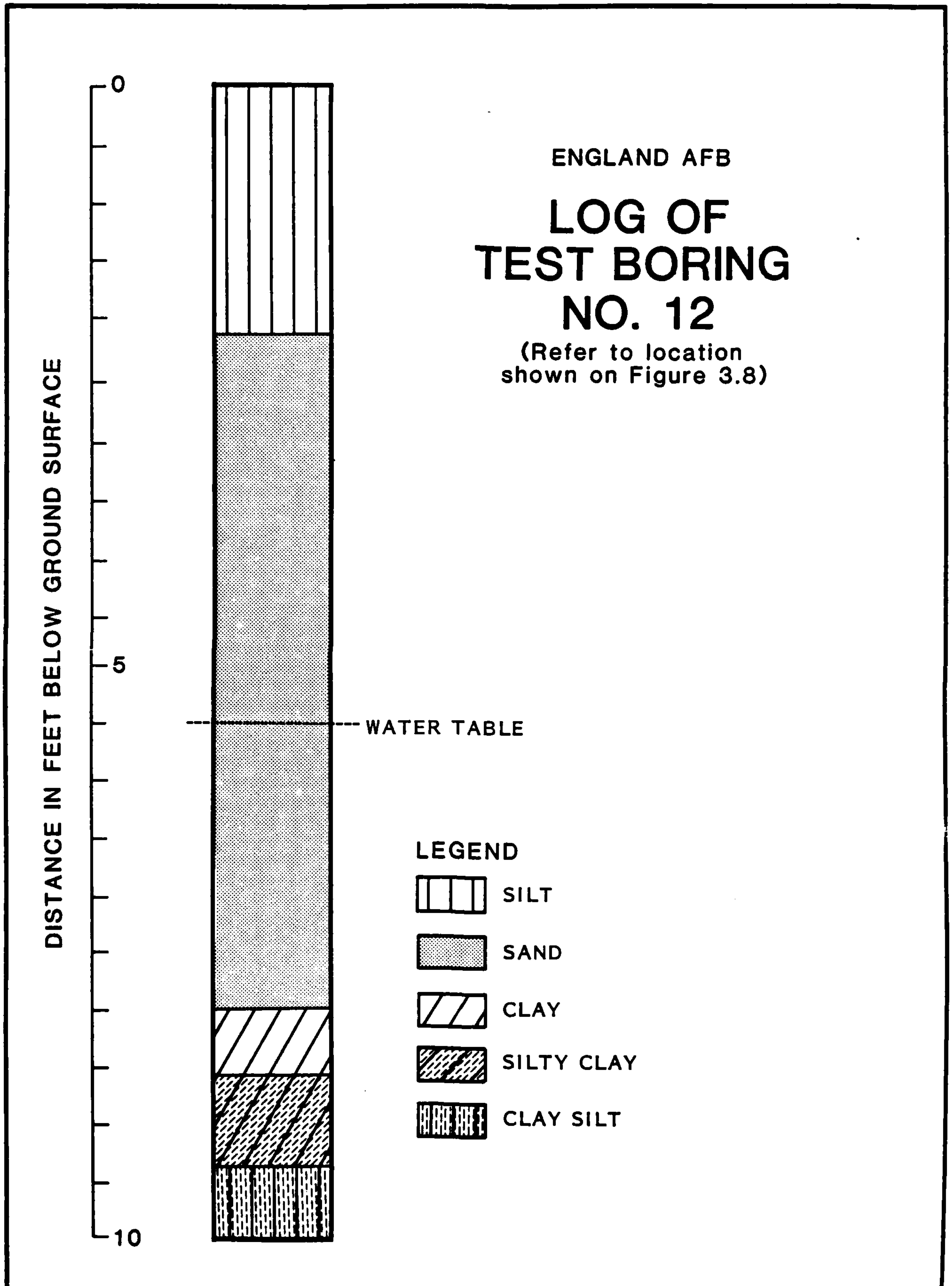


LEGEND

- SILTY CLAY
- CLAY
- CLAY SILT

NOTE: GROUND-WATER LEVEL NOT RECORDED

SOURCE: ENGLAND AFB INSTALLATION DOCUMENTS



SOURCE: ENGLAND AFB INSTALLATION DOCUMENTS

For the purposes of this discussion, the Miocene is divided into two major elements, the Fleming Formation at the top and the Catahoula Formation at the bottom (from Newcome and Sloss, 1966). The Fleming Formation is further subdivided into the Lena, Carnahan Bayou, Dough Hills, Williamson Creek, Castor Creek and Blounts Creek Members. These units and their major subdivisions are shown in cross-section on Figure 3.7. In Rapides Parish, outcrops of Miocene materials are limited to the valley walls of deeply cut streams and to a 100-square mile area in the northwest corner.

The Miocene beds contain thick, predominantly sandy strata alternating with thinner clayey intervals (Newcome and Sloss, 1966). The thickest clay section present is the 300 foot thick Lena Member, which forms the boundary between the Fleming and Catahoula Formations. Generally, sandy members of the Fleming Formation contain individual sand beds (better sorted sand deposits having little fines present), which have been classified and numbered to permit detailed study. These sand beds exist as lens-shaped deposits, frequently pinching out, which make correlation over long distances difficult (refer to Figure 3.7). The sand beds will be discussed in greater detail later in this report.

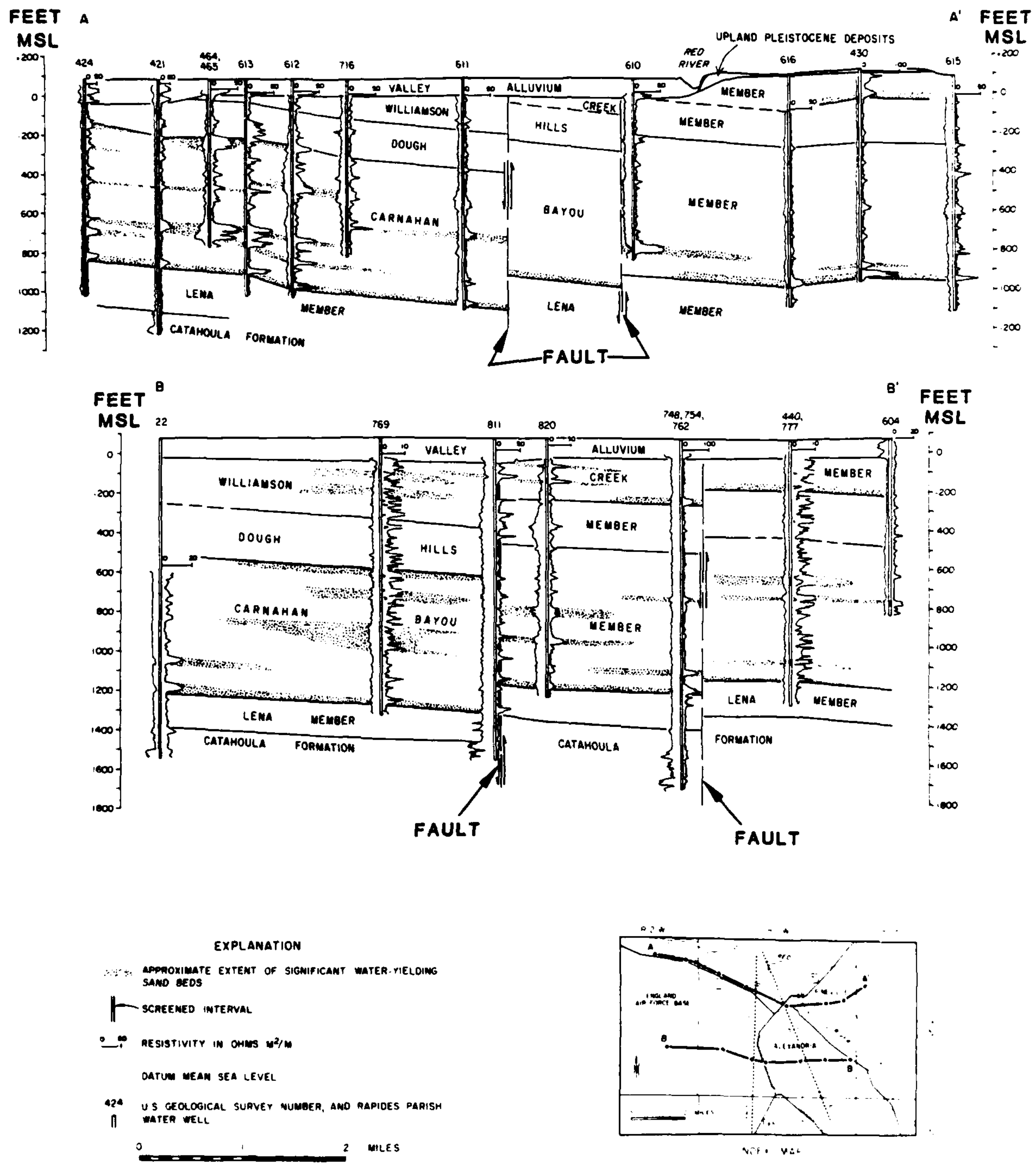
Structure

The major structural features of the study area include the dip of the Miocene units and their local disruption by faulting. The Miocene units represented in the study area tend to thicken substantially downdip, to the South and Southeast. Measurements taken on the series basal beds indicate a southward dip of 75 to 150 feet per mile (Newcome and Sloss, 1966). This follows the general regional trend of thickening toward the Gulf of Mexico, an active geosyncline.

Two north-trending faults disrupting Miocene units have been mapped in the Alexandria area. Other faults may be present. These faults are shown on Figure 3.7. According to Newcome and Sloss (1966), their potential impact may be great, since the offset caused by their movement may have joined, interrupted or altered previously discrete units. The modification of water bearing units could influence the movement of ground water toward discharge points.

STUDY AREA

GEOLOGIC CROSS-SECTIONS



SOURCE: MODIFIED FROM NEWCOME and SLOSS (1966)

HYDROLOGY

Introduction

Ground-water hydrology of the project area has been reported by Klug (1955), Newcome (1960), Rollo (1960), Newcome and Sloss (1966) and Terry et al. (1979). Additional information has been obtained from interviews with U. S. Geological Survey personnel and the Alexandria Municipal Water Department.

Hydrogeologic Units

England Air Force Base is located within the Red River Valley of the Gulf Coastal Plain. In this area, two major sources of ground-water supplies have been identified. The units of particular interest to this investigation are:

- Red River Alluvium (Shallow)
- Miocene Deposits (Deep).

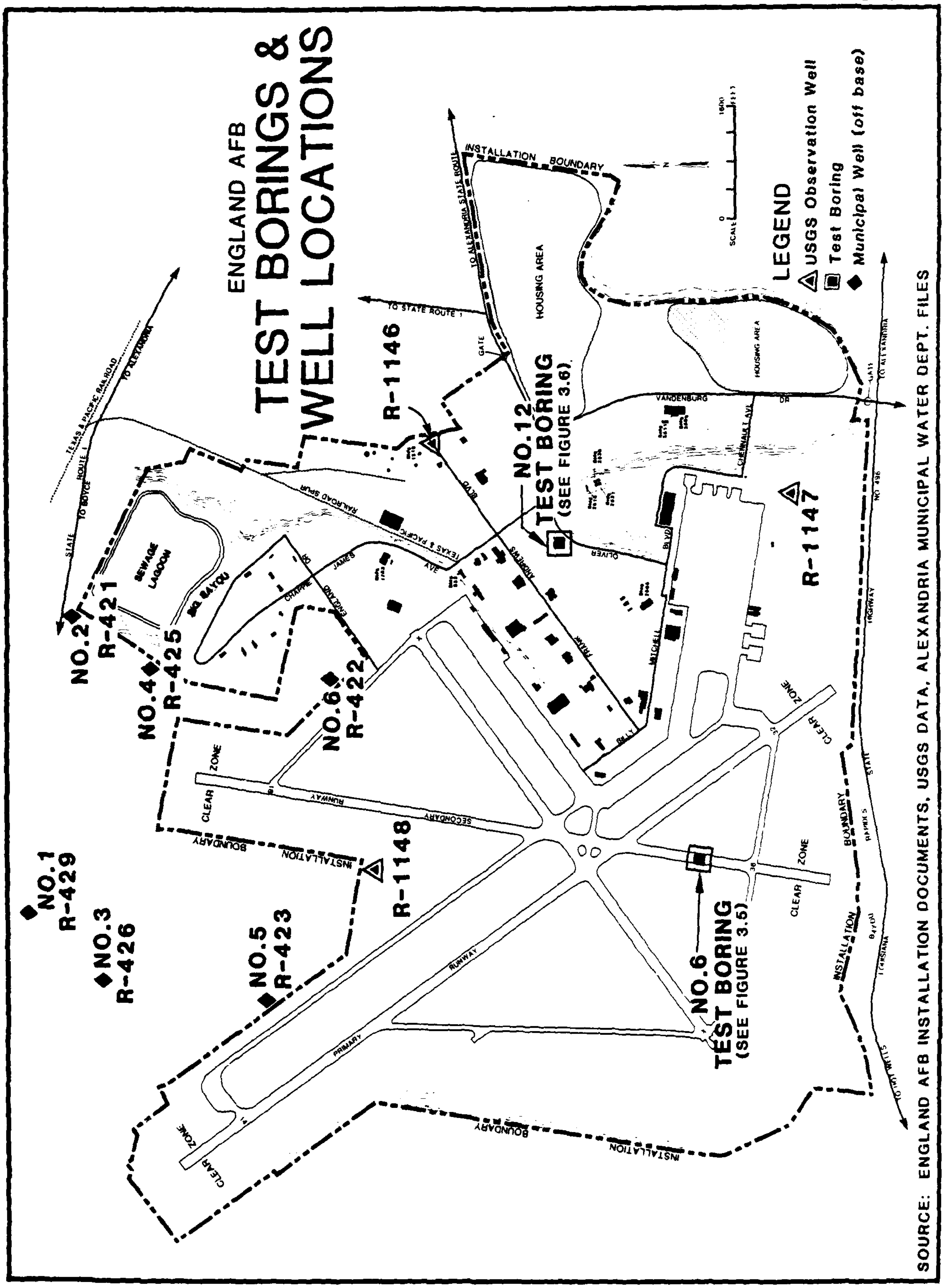
Shallow Unit

The Red River Alluvium forms a significant aquifer in the Alexandria area and is of interest because it occurs at, or near, ground surface at England Air Force Base. The unit is variably permeable and corresponds to that described in the discussion of site geology. Ground water occurs at shallow depths in the alluvium under both water table (unconfined) and artesian conditions (confined).

Recharge of the alluvium occurs primarily by precipitation falling on exposed portions of the unit. According to Newcome and Sloss (1966), this unit also receives recharge from adjacent upland Pleistocene terrace sands and from underlying Miocene deposits. Recharge received from the Pleistocene terrace moves under the influence of gravity to the alluvium where hydraulic pressures decrease. In some areas, additional recharge under artesian pressure, is transmitted upward to the alluvium from the Miocene. Prior to the development of Miocene aquifers for water resources, all valley alluvium received some degree of recharge from the Miocene (Newcome and Sloss, 1966).

At England Air Force Base, ground-water levels in the alluvium have been monitored by the use of three observation wells installed by the U.S. Geological Survey (USGS). Observation and water supply well locations are presented on Figure 3.8. A summary of water levels observed in the USGS alluvial wells at England AFB follows.

FIGURE 3.8



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USGS Well No.	Depth to Ground Water Measured from Surface, in Feet	Date of Measurement
R-1146	5.19	15 February 1978
R-1147	8.34	14 February 1978
R-1148	2.69	10 February 1978
R-1148	6.20	11 May 1978

The log of USGS Well No. 1148 is presented as Figure 3.9. According to D'Appolonia Consulting Engineers, Inc. (1980), alluvial ground-water levels at England AFB average ten feet below ground surface.

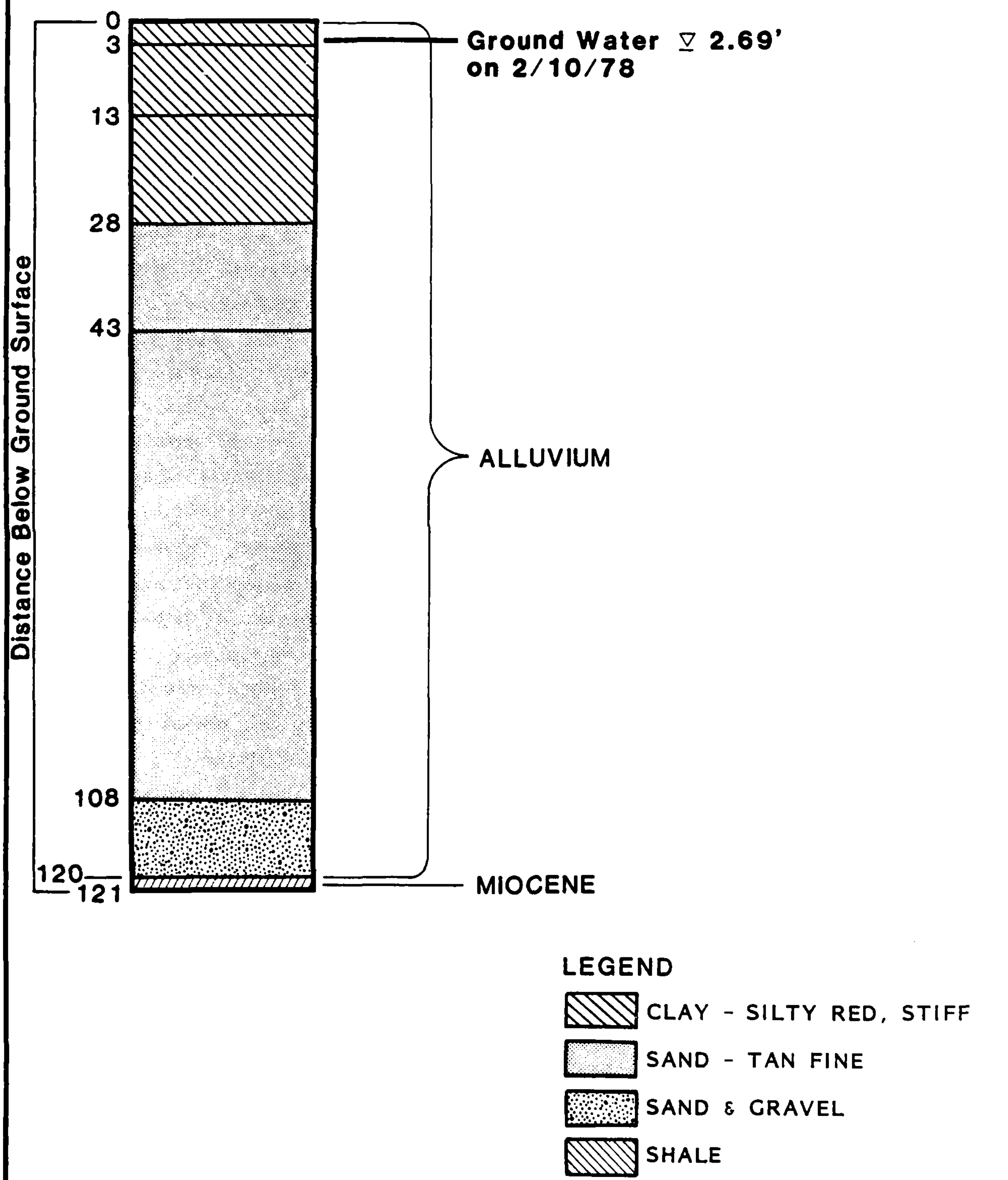
Alluvial ground-water movement at England Air Force Base proceeds in an generally northeast direction to the Red River (Figure 3.10), whose present bed (at an elevation of 15-35 feet, MSL) cuts into the aquifer along most of its course. During most of the year, ground water is discharged from the alluvial aquifer and becomes Red River base flow. In October 1960, this discharge was measured at 20 mgd, an average of 0.4 mgd (0.6 cfs) per mile of valley in Rapides Parish (Newcome and Sloss, 1966). At river flood stage, ground-water flow conditions reverse in areas adjacent to the river. This situation is normally of short duration, thus, impacts are slight. A long term increase in river levels would lead to surface soils saturation and local flooding in valley lowlands, as the alluvial aquifer has little additional storage capacity available to retain large quantities of "new" water.

The close relationship between the alluvial aquifer and the Red River may be seen on the water level contour maps, presented as Figure 3.10. This figure also illustrates general flow directions with respect to the project area and the slight alteration of flow caused by seasonal changes in the Red River's stage.

Alluvial sands may provide large supplies of water for irrigation purposes. Wells 75 to 150 feet deep typically provide volumes in the range of 250 to 1700 gallons per minute. Because of excessive hardness and iron content, most domestic, municipal and industrial consumers derive water resources from the Miocene aquifers underlying the alluvium.

ENGLAND AFB

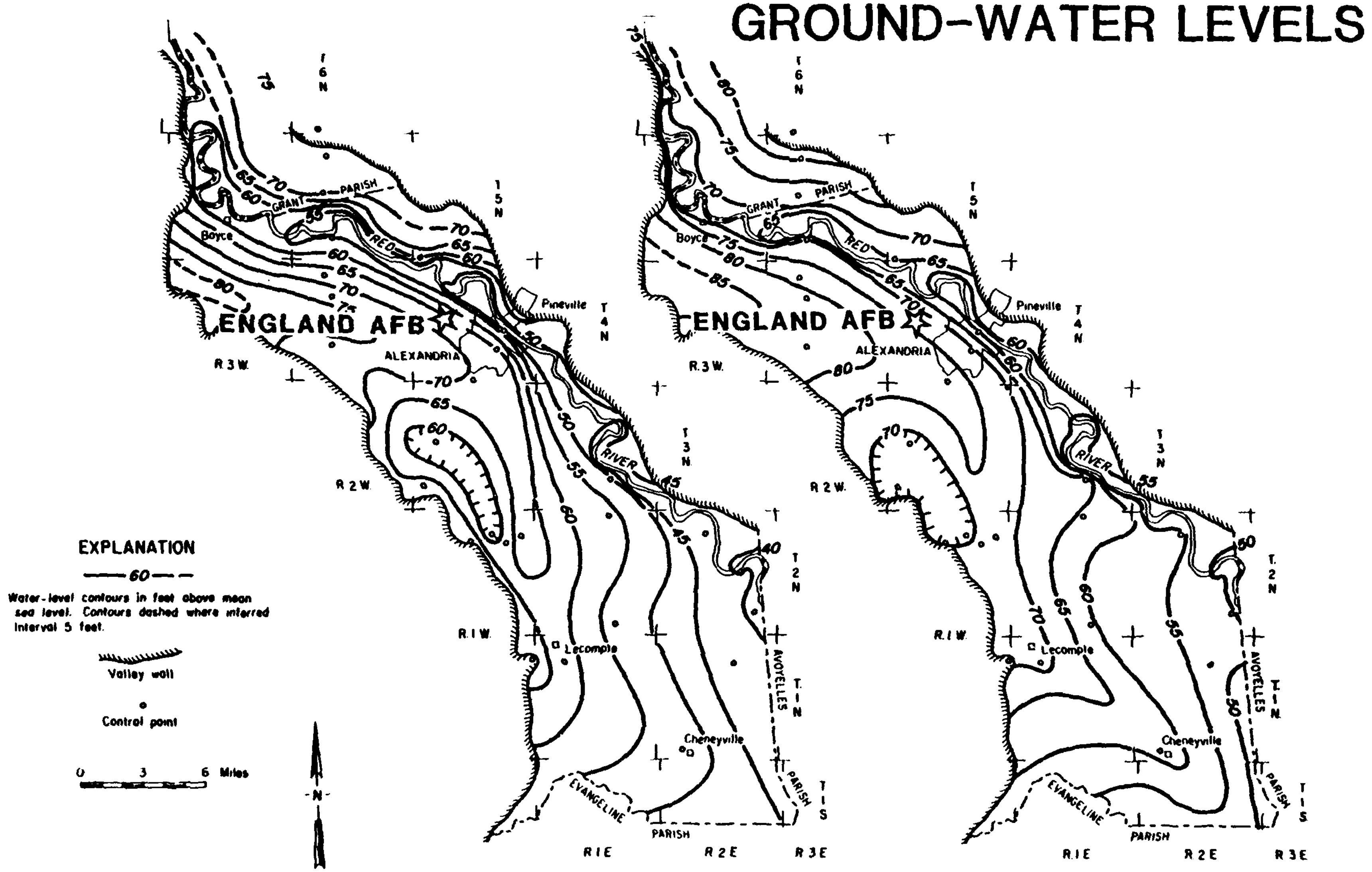
LOG OF ALLUVIAL AQUIFER OBSERVATION WELL NO. R-1148



SOURCE: USGS DATA

FIGURE 3.10

STUDY AREA
ALLUVIAL AQUIFER GROUND-WATER LEVELS



OCTOBER 1960

SOURCE: NEWCOME and SLOSS (1966)

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Deep Units

The deep hydrogeologic units present in the study area are reported to be the major sand members of the Miocene age Fleming and Catahoula Formations. The individual sand members are numbered and grouped into aquifers designated by the typical depths at which drillers encounter them in the Alexandria area. For example: the 400-foot, 700-foot and 1000-foot sands are the widely used aquifers of the project area. The sands are typically separated by interbedded clay or shale zones, which may be seen on Figure 3.11, the log of Alexandria Municipal Well No. 6 (USGS No. R-422).

The Miocene sands are regional in extent and are present in the study area at moderate depth (100± feet below ground surface). They receive recharge from rainfall on zones where they are exposed in northwest Rapides Parish and in the parishes north and west of Rapides. Some recharge is available from overlying alluvium or from Pleistocene deposits in highland areas north and west of Alexandria, where hydraulic pressures are sufficiently high. Ground water usually occurs under artesian (confined) conditions within the Miocene sands. At England Air Force Base, ground-water levels within this unit are approximately 190-200 feet below ground surface. Aquifer nomenclature and water levels are summarized on Table 3.4.

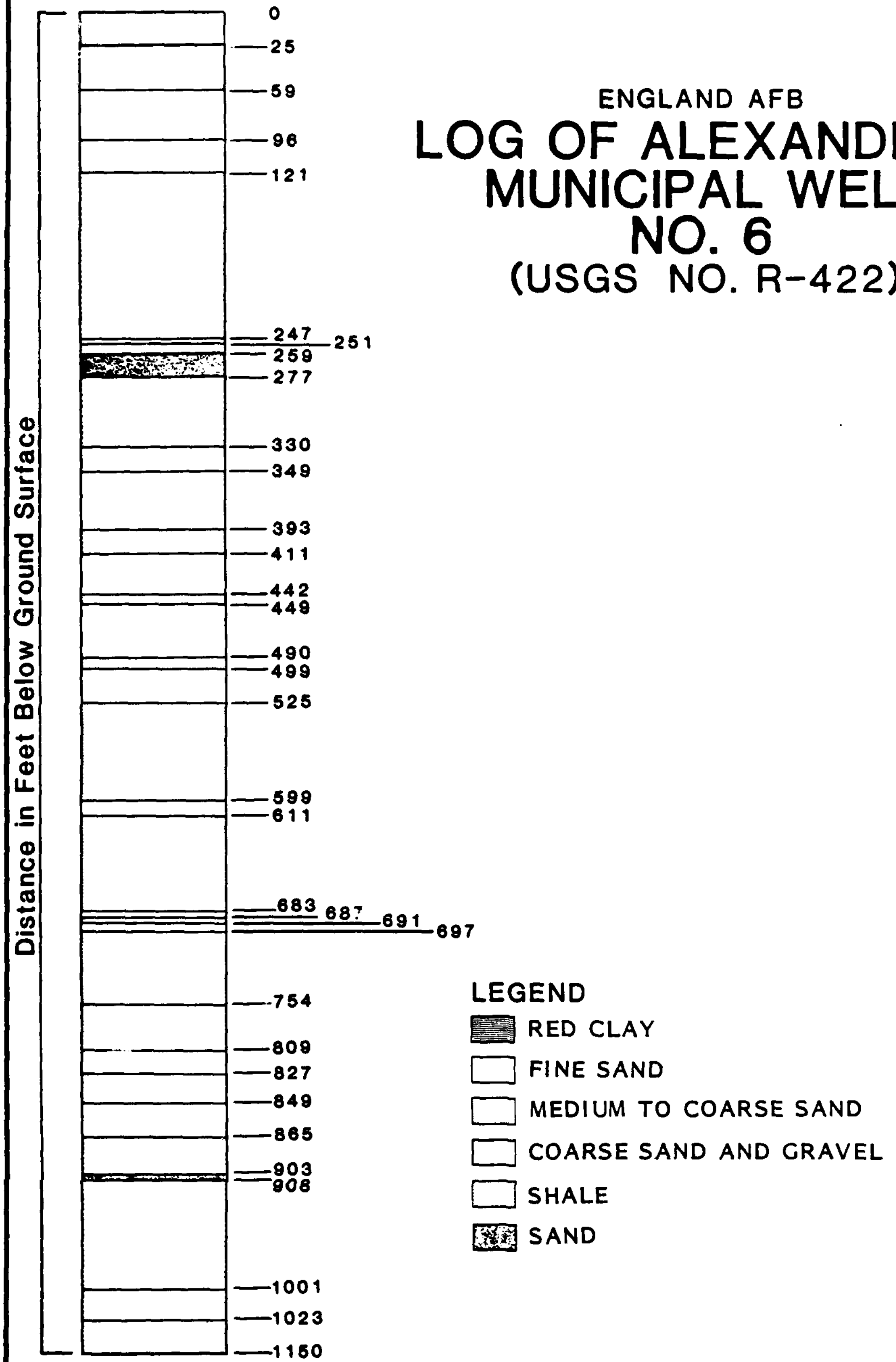
In past years, most discharge from the Miocene aquifers was directed upward, under the force of artesian pressure, into the overlying alluvial deposits (Newcome and Sloss, 1966). Because concentrated pumpage at major population centers such as Alexandria has reduced artesian pressures, discharge to alluvial materials now occurs locally, but not regionally. Along the valley margins west of England AFB, wetlands are maintained by flow from the Miocene aquifers.

Ground-water flow directions and velocities are strongly influenced by pumping. Figure 3.12 depicts Miocene aquifer water levels and generalized flow directions. Flow has been directed toward the large drawdown features caused by concentrated pumping and natural discharge areas have been reduced in size. Ground water flow in this aquifer system is apparently northeast with respect to England Air Force Base, toward the Bayou Rapides well field, just north of the base (well locations are shown on Figure 3.8).

ENGLAND AFB

LOG OF ALEXANDRIA MUNICIPAL WELL NO. 6

(USGS NO. R-422)



SOURCE: ALEXANDRIA MUNICIPAL WATER DEPARTMENT FILES

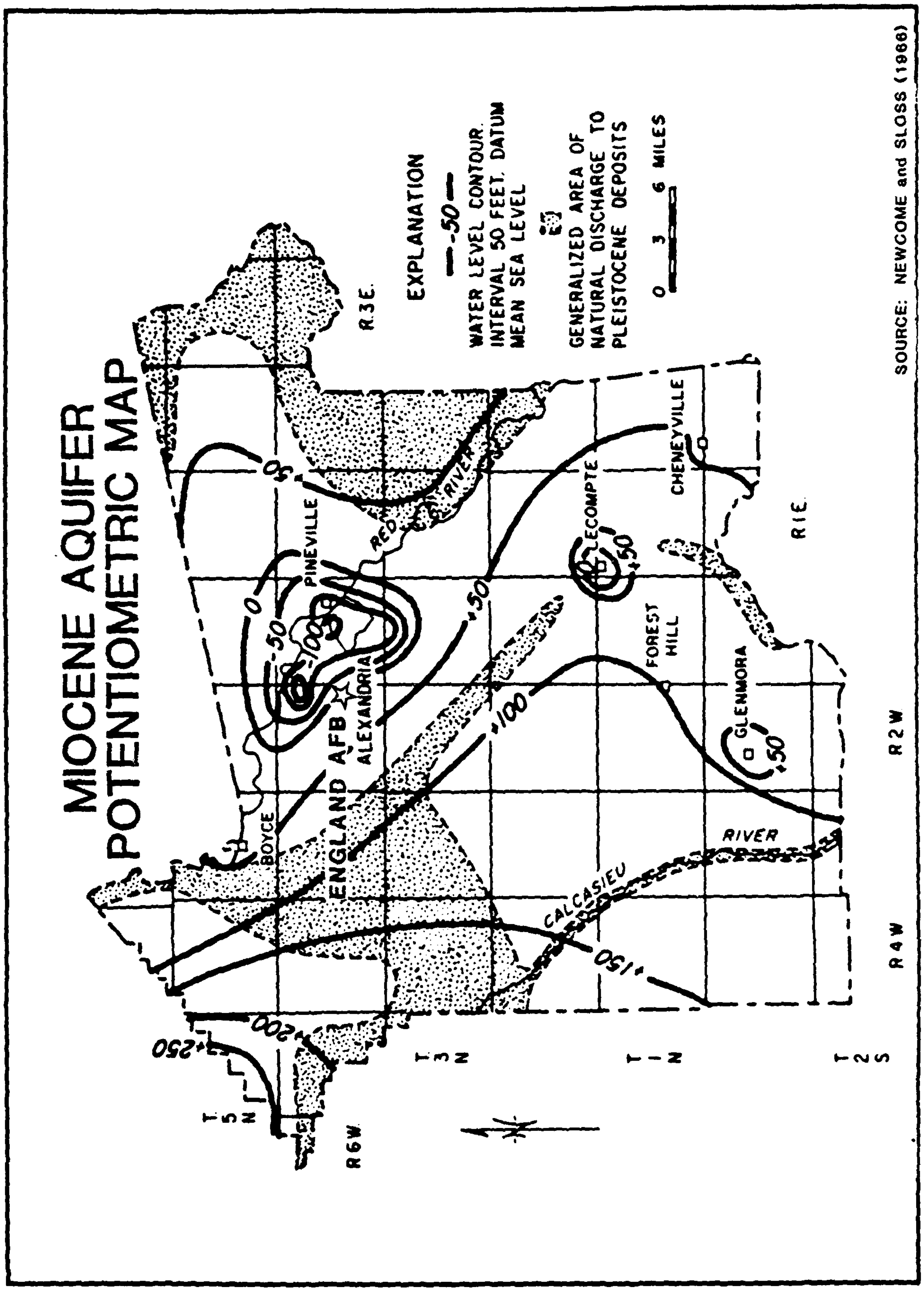
TABLE 3.4
MIOCENE AQUIFER DATA
Alexandria Area, LA

Sand*	Sand Designation by Klug (1955)	Elevation of Static Level 1962 (Reference, Mean Sea Level) (In Hundreds of Feet)
WC-2	"400-foot" sand	-20 in city
WC-1	"400-foot" sand	-20 in city
CB-7	"400-foot" sand	At sea level near EAFB (England Air Force Base) +15 near EAFB
CB-5	"700-foot" sand	At sea level to -125 in city -110 near EAFB
CB-3		-90 at National Guard Armory -175 at EAFB
CB-2	"700-foot" sand	-160 to -185 in city near EAFB
CB-1	"1,000-foot" sand	-25 to -100 in city
CB-0	"1,000-foot" sand	-50 to -160 in city -120 to -150 in EAFB area At sea level at National Guard Armory

* WC, Williamson Creek Member; CB, Carnahan Bayou Member. Refer to Figure 2.2 for location of National Guard Armory.

Source: Newcome and Sloss (1966).

FIGURE 3.12



MIOCENE AQUIFER
POTENTIOMETRIC MAP
EXPLANATION
-50
WATER LEVEL CONTOUR.
INTERVAL 50 FEET. DATUM
MEAN SEA LEVEL
GENERALIZED AREA OF
NATURAL DISCHARGE TO
PLEISTOCENE DEPOSITS
0 3 6 MILES
SOURCE: NEWCOME and SLOSS (1966)
ENGLAND AFB
ALEXANDRIA
PINEVILLE
BOYCE
LECOMPTE
CHENEYVILLE
FOREST HILL
GLENMORA
RED RIVER
CALCASIEU RIVER
R 6 W
R 4 W
R 2 W
R I E
R 3 E
T 5 N
T 3 N
T 1 N
T 2 S
+250
+200
+150
+100
+50
0
-50
-100

According to Newcome and Sloss (1966), Miocene water levels have been reduced so drastically in some areas that a hydraulic connection now exists between the Miocene and the overlying alluvium. In this case, the region's normal pattern has been reversed and the overlying alluvium is now recharging the Miocene sands.

Because the Miocene aquifers are the principal regional water sources, numerous studies have been performed. They indicate that the excessive drawdowns can be mitigated by distributing the wells in fields over larger land areas and by planning greater separations between fields.

Base Water Supplies

England Air Force Base purchases its water resources from the Alexandria Municipal Well System. Wells are located throughout the Parish and are screened into the Miocene aquifers, they average 1,100 feet in depth (See Figure 3.8). Figure 3.11 is the log of a representative well in the Bayou Rapides field north of the base. Wells located immediately north of the installation furnish supplemental water to the Alexandria Municipal Well System.

ENVIRONMENTAL CONSIDERATIONS AT ENGLAND AFB SATELLITE FACILITIES

Three satellite facilities of England Air Force Base have been examined during the course of this study. They include Cotile Recreation Area, Claiborne Range and the Lake Charles Radar Site.

Cotile and Claiborne Facilities, Rapides Parish

Claiborne Air-to-Ground Range derives water resources from wells. Because driller's logs describing well construction and subsurface conditions were not available for review for this study, it is not possible to perform an adequate evaluation of waste migration potential at these sites. According to Fisk (1940), who investigated the geology of Rapides and Avoyelles Parishes, both Cotile and Claiborne are located in the Dough Hills, southwest and west of England AFB. The Dough Hills form a distinctive rolling topographic surface which borders the Red River Valley to the north and northeast. Three geologic units have been identified at the Cotile and Claiborne sites:

- Uplands are characterized by terrace deposits of the Pleistocene Bentley and Williana Formations. Both formations are sandy and contain extensive gravel deposits which are mined commercially. In Rapides Parish, Williana Formation sequences approach a thickness ot 100 feet.

- Lowlands are dominated by the Castor Creek, Williamson Creek and Blounts Creek Members of the Miocene Fleming Formation. These units are typically composed of calcareous clays, siliceous silts and fine sands that often form the walls of local stream valleys.
- Stream bottoms and flood plains are covered by recent alluvial deposits of variable thickness. These deposits tend to be fine-grained, but usually contain lenses of sand and/or gravel.

The headwaters of numerous area streams form in the Williana and Bentley terraces. Most area streams flow northward along a gentle gradient, and dendritic drainage patterns predominate. The depth to ground water is estimated to be twenty feet or less in this area. It is doubtful if a significant separation (such as a distinct clay layer) exists between ground surface and the water table. According to Newcome and Sloss (1966), ground water exists in terrace deposits under unconfined conditions. Water levels tend to fluctuate substantially in response to precipitation recharge of the local ground-water reservoir.

Contamination emanating from a disposal point would probably reach the water table with relative ease. Once in the water table aquifer, it is believed that contaminants would probably be discharged in base flow to area streams. Contamination would probably not migrate to the aquifer. Driller's logs describing well construction and subsurface conditions were not available to document this assessment.

Lake Charles Air Force Station, Calcasieu Parish

Information relative to the geology and ground-water resources of the Lake Charles Air Force Station and environs has been obtained from Jones et al. (1954), Harder (1960), Whitman and Kilburn (1963) and Nyman (1982). The Lake Charles site occupies a position on the relatively level Gulf Coastal Plain, two miles southwest of Chennault Airport. Ground surface at the site is approximately 20 feet (NGVD). Surface soils of the area appear to be recent flood plain deposits of silty fine sands. This stratum is believed to be 10-15 feet thick in the vicinity of the project area (Jones et al., 1954).

Area geology is dominated by fluvial deposits of Pleistocene Age. Uppermost is the Prairie Formation which is most probably present just below ground surface at the site. The Prairie is an essentially sandy sequence and is an upper aquifer for the Lake Charles area, known as the Chicot Shallow sands. Major geologic units present below the Prairie include the Montgomery, Bentley and Williana Formations. All of these Pleistocene units correspond to aquifers of regional significance, which are identified by their depth of occurrence and collectively called the Chicot Aquifer. They are summarized as follows (from Harder, 1960):

Formation	Aquifer	Quantity of Water
Prairie	Chicot shallow sands	Provides small quantities of mineralized supplies
Montgomery	200-foot sand	Furnishes large quantities
Bentley	500-foot sand	Most extensively exploited aquifer
Williana	700-foot sand	Furnishes large quantities

A sixty foot thick clay sequence effectively separates the Prairie from the underlying Montgomery, thus providing isolation for the 200-foot sand zone (Nyman, 1982). Each successive sand zone is separated by clays from the water-bearing zone above it (Harder, 1960, Plate No. 3).

Although the 200 and 700 foot sand zones can easily be exploited for their potential water resources, the 500-foot sand is the most extensively developed aquifer. Consequently, the largest drawdowns are observed in the potentiometric surface of the 500-foot sand.

Ground-water flow in most members of the Chicot Aquifer follows a generally westward trend, with the possible exception of the 500-foot sand. In this case, extensive ground-water withdrawals have redirected ground-water flow to the northwest (Nyman, 1982). Flow directions in the shallow zone are subject to local controls and should be determined on a site-specific basis.

Formerly, the Lake Charles Radar Site obtained water supplies from its own wells. The first well installed (USGS No. Cu-682) was screened into the 200-foot sand, was abandoned and replaced for unspecified reasons. The replacement well, USGS No. Cu-1030, was abandoned in 1981 because of suspected bacteria and mercury contamination. No obvious potential sources of contamination were observed during a site inspection and area reconnaissance conducted for this study. At present, water supplies are purchased from municipal sources.

Due to the generally permeable nature of surface soils and the high water tables common in the Prairie Formation, waste-related contamination could migrate into the Chicot shallow aquifer system. The possibility of contaminating lower aquifer zones is not considered likely.

GROUND-WATER QUALITY

Ground-water quality information has been obtained from the publications previously cited, installation documents and interviews with USGS and Alexandria Municipal Water Department personnel. Alexandria municipal wells penetrating the regional aquifers produce water of good quality (Rogers, 1982; Despino, 1982). The shallow aquifer is usually not utilized in the Alexandria area because of excessive hardness and iron concentrations (Newcome and Sloss, 1966; Rogers, 1982).

Installation documents indicate that water of generally good quality is obtained from the wells located at the Claiborne Air-to-Ground Range.

Installation documents indicate that a well serving the Lake Charles Air Force Station was abandoned and replaced with purchased supplies because of suspected mercury and bacterial contamination. Based on a review of the site's history, the well contamination at the Lake Charles Air Force Station is not due to past or current site activities.

SURFACE WATER QUALITY

Water Quality Monitoring

Surface water sampling at England AFB has been conducted under the auspices of the Bioenvironmental Engineering Services. Samples are collected quarterly at several locations on the installation and analyzed for approximately 30 parameters. The surface water monitoring system began voluntarily in the early 1970's and later incorporated NPDES permit sampling.

The surface water sampling locations presently include five stations as described in Table 3.5 and shown in Figure 3.13. Two sampling

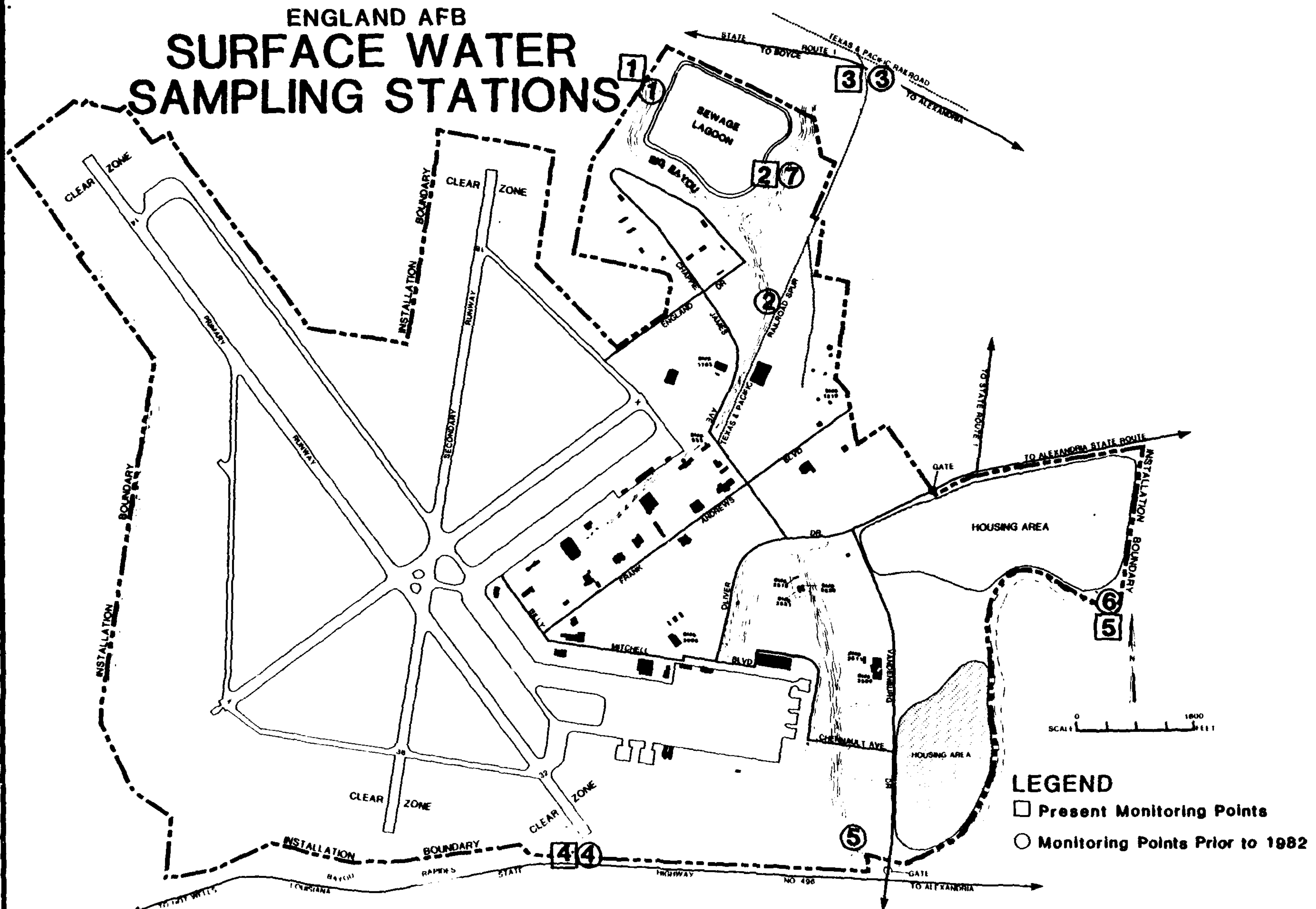
TABLE 3.5

SUMMARY OF ENGLAND AFB ACTIVE AND INACTIVE
SURFACE WATER SAMPLING STATION LOCATIONS

Current Location No.	Location No. Prior to 1982	Site Description
1	1	Big Bayou, Ambient - Upstream of Sewage Lagoon
2	7	Sewage Lagoon Effluent
3	3	Big Bayou, Ambient - Downstream from Sewage Lagoon
4	4	Bayou Rapides, Ambient - Upstream
5	6	Bayou Rapides, Ambient - Downstream
	2 (inactive)	POL Bayou
	5 (inactive)	Back Gate Bayou

FIGURE 3.13

ENGLAND AFB
SURFACE WATER SAMPLING STATIONS



SOURCE: BIOENVIRONMENTAL ENGINEERING SERVICES DOCUMENTS locations are associated with Bayou Rapides and two with the Big Bayou. The fifth sample station is located at the sewage lagoon and is analyzed for treatment process parameters only.

Prior to 1982, two additional locations were used for collection of surface water samples. Descriptions of these sampling points are also summarized in Table 3.5 and Figure 3.13. These on-base monitoring points were eliminated and sampling currently consists of base borderline water monitoring.

The surface water sample data for the installation indicates that, in general, the surface water quality on the installation is no different from the surface water quality entering the installation.

Summary of Environmental Setting

The environmental setting data reviewed for this investigation indicate the following major items that are relevant to the evaluation of past hazardous waste management practices at England Air Force Base and its satellite facilities:

- Surface soils of the England Air Force Base area are typically fine-grained silts and clays with generally low permeabilities, and possess shallow water levels (ten feet below ground surface or less).

- Surface soils of the Cotile Recreation Area, Claiborne Air-to-Ground Range and the Lake Charles Air Force Station are sandy, permeable and possess shallow water levels (estimated to be less than twenty feet).

- The primary regional aquifer underlies England Air Force Base at moderate depth (minimum 120 feet below ground surface). A shallow aquifer is present at or near ground surface which is in close communication with the Red River. The shallow aquifer is considered to be of limited significance in the study area. However, because of large scale pumpage conducted in some municipal well fields. Recharge from the alluvium to the underlying regional aquifer may have been induced locally.

- Flooding is not normally a problem at England Air Force Base.

- The mean annual precipitation for the base is 56.9 inches and net precipitation is calculated to be eight inches.

- No indication of ground-water contamination was noted during the water-quality records search for Cotile, Claiborne or the main installation. Reportedly, a ground-water contamination problem does exist at the Lake Charles Air Force Station, but its source(s) is not considered to be related to past station activities.

- The surface waters entering and exiting the base are considered to be of similar quality. England AFB activities do not degrade stream water quality.

- No threatened or endangered species have been observed within the main England Air Force Base boundaries. Transient species may occasionally pass through the Cotile Recreation area or the Claiborne Range.

- The Red Cockaded woodpecker is indigenous to Central Louisiana and is found on Claiborne Air-to-Ground Range.

From these major points, it may be deduced that potential pathways for the migration of hazardous waste-related contamination exist. If hazardous materials are present in or on the ground, they may encounter a shallow (water table) aquifer and subsequently be discharged with baseflow to area surface waters. However, the potential for the migration of contamination to a major regional aquifer is considered to be unlikely, as it could only occur where flow has been artificially induced between the overdrawn regional aquifer and the shallow aquifer.

SECTION 4
FINDINGS

SECTION 4

FINDINGS

To assess past hazardous waste management at England AFB, current and past activities of waste generation and disposal were reviewed. This section contains a summary of the wastes generated by activity, a description of disposal methods used at England AFB, and an identification and evaluation of disposal sites located on the base.

PAST ACTIVITY REVIEW

To determine past activities on the base that resulted in generation and disposal of hazardous waste, a review was conducted of current and past waste generation and disposal methods. This review consisted of interviews with base employees, a search of files and records, and site inspections.

Potentially hazardous wastes generated on England AFB can be associated with one of the following four activities carried out on base:

- Industrial Operations (Shops) and Laboratories
- Fuels Management (POL)
- Pesticide Utilization
- Fire Training

The following discussion addresses only those wastes generated on base which are either hazardous wastes or potentially hazardous wastes. In this discussion, a hazardous waste is defined as hazardous by either the Resource Conservation and Recovery Act (RCRA) or Comprehensive Environmental Response Compensation and Liability Act (CERCLA). A potentially hazardous waste is one which is suspected of being hazardous, even in cases where insufficient data was available to fully characterize the waste.

Industrial Operations (Shops)

Several industrial shops at England AFB generate potentially hazardous wastes as a result of mission support activities. Bioenvironmental Engineering Services (BES) provided a listing of industrial shops which was used as a basis for evaluating past waste generation and hazardous material disposal practices. The BES shop files were examined for information on chemial usage, hazardous waste generation, and disposal practices. Although the files contained no information prior to the mid-1970's, information was available for the past several years. A summary review of the shop files and interviews is included as Table C.1 in Appendix C. Table D.1 lists present and past shop locations (with dates of operation) and information regarding hazardous material generation and handling. The list is complete for the 64 active and retired shops at England AFB.

For the shops which handled hazardous materials or generated hazardous waste, key personnel within the EAFB maintenance support functions were interviewed. During the interviews, information was gathered concerning hazardous waste materials utilized, waste quantities generated and disposal practices for each shop. A timeline of disposal methods was then established for the major wastes generated. A summary of information obtained during the shop review is presented in Table 4.1. This table presents a list of building locations as well as the waste material names, waste quantities and disposal method timeline. Much of the disposal method information is based on speculative information derived from personnel currently on base. Confirmation of some of the past disposal methods within the shops was difficult because of the typically short tenures of many of the past military shop personnel at England AFB. The waste quantities shown in Table 4.1 are based on verbal estimates given by shop personnel at the time of the interviews, as well as information derived through the record searches from the BES files. Areas of EAFB which do not generate hazardous waste, or have generated insignificant quantities of hazardous wastes, were eliminated from Table 4.1.

In general, shop wastes have been drummed or stored in tanks prior to contract disposal off-site. There are 16 sites designated as drummed waste accumulation sites located on England AFB. These drummed waste accumulation sites are located in areas away from the buildings, but still convenient to the shop. These drum storage areas are typically uncovered and have a sand or gravel base.

Based on a site inspection at each of the drum accumulation areas, all drums were determined to be sealed and in good condition. There was no evidence of past leakage. According to personnel interviews, any

Table 4.1

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	LOCATION (Bldg. No.) PRESENT	LOCATION (Bldg. No.) PAST	WASTE MATERIAL	WASTE QUANTITY*	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL 1950 1960 1970 1980
23rd COMPONENT REPAIR SQUADRON (CRS)					
BATTERY/ELECTRIC	2502	111	WASTE SULFURIC ACID	10 GALS./MO.	NEUTRALIZE, THEN TO SANITARY SEWER
			POTASSIUM HYDROXIDE	1 GAL./MO.	NEUTRALIZE, THEN TO SANITARY SEWER
NONDESTRUCTIVE INSPECTION	2528	2502, 111	PENETRANT (DYE) MAGNAFLUX ZL22A	110 GALS./YR.	SANITARY SEWER (1) → DRUMMED TO DPDO
			EMULSIFIER (MAGNAFLUX ZL3)	110 GALS./YR.	SANITARY SEWER (1) → DRUMMED TO DPDO
			X-RAY FIXER	25 GALS./YR.	SANITARY SEWER (1) → RETURNED TO X RAY HOSPITAL
			PD 680	55 GALS./6 MOS.	SANITARY SEWER → DRUMMED TO DPDO
			7808 OIL (w/TCA & Xylene)	60 GALS./YR.	SANITARY SEWER → TO PROPULSION SHOP
PROPULSION (JET ENGINE)	2102	113	PD-680	35 GALS./MO.	TO TANK THEN REMOVED BY CONTRACTOR (DPDO)
			TCA	20 GALS./MO.	TO MIXED WASTE TANK THEN REMOVED BY CONTRACTOR (DPDO)
			7808 OIL	45 GALS./MO.	TO MIXED WASTE TANK THEN REMOVED BY CONTRACTOR (DPDO)
			CARBON REMOVER	30 GALS./MO.	TO MIXED WASTE TANK THEN REMOVED BY CONTRACTOR (DPDO)
			JP-4	55 GALS./MO.	TO MIXED WASTE TANK THEN REMOVED BY CONTRACTOR (DPDO)
TEST CELL	2615		JP 4	80 GALS./MO.	TO OIL/WATER SEPARATOR
PNEUDRAULIC	2502	111	HYDRAULIC FLUID	55 GALS./MO.	DRUM TO DPDO

KEY

——— CONFIRMED TIME FRAME DATA BY SHOP PERSONNEL

------ ESTIMATED TIME FRAME DATA BY SHOP PERSONNEL

PD-680: SOLVENT
PS 661: SOLVENT
*BASED ON CURRENT RATES

(1) PRIOR TO 1969, NDI DID NOT EXIST AS A SEPARATE SHOP, LOCATED IN WELDING SHOP, WASTES WERE POURED INTO THE SANITARY SEWER.

Table 4.1 (continued)

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	LOCATION (Bldg. No.) PRESENT	PAST	WASTE MATERIAL	WASTE QUANTITY *	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL (50 60 70 80)
23rd CIVIL ENGINEERING SQUADRON (CES)					
ENTOMOLOGY	1703	1210	EMPTY CONTAINERS	5 EA/MO.	TO GENERAL REFUSE
			RINSE SOLUTIONS	45 GALS./MO.	RINSE TO SANITARY SEWER
			BANNED PESTICIDES	2 5 GAL. CONTAINERS/DDT	DPDO STORAGE ▲ 1981 (DISPOSED OF)
EXTERIOR ELECTRIC	1210	1703	PCB TRANSFORMERS		TAKEN BY CIVIL ENGINEERING THEN REMOVED BY CONTRACTOR (DPDO)
POWER PRODUCTION	1703	1206	ENGINE OIL	55 GALS./MO.	TAKE TO CE WASTE TANK
23rd COMBAT SUPPORT GROUP (CSG)					
PHOTO LAB	1009		FIXER	12 GALS./MO.	SANITARY SEWER; SILVER RECOVERY & SANITARY SEWER
			DEVELOPER	14 GALS./MO.	SANITARY SEWER
AUTO HOBBY	1434	1433	MOTOR OIL	70 GALS./MO.	DRUMMED TO CE WASTE TANK; UNDERGROUND TANK PUMPED BY CONTRACTOR
			TRANSMISSION FLUID	4 GALS./MO.	TO OIL/WATER SEPARATOR
			PS 661/PD 680	10 GALS/MO.	DPDO CONTRACTOR DISPOSAL
23rd EQUIPMENT MAINTENANCE SQUADRON (EMS)					
CORROSION CONTROL	2502	111	PAINT THINNER	15 GALS/MO.	DRUMMED TO CONTRACTOR
			PD 680	1000 GALS./YR.	TO OIL/WATER SEPARATOR (from washing planes, stopped in 1981)
FUEL SYSTEMS	814	525	JP-4	60 GALS/MO.	TO CE WASTE TANK

KEY

——— CONFIRMED TIME FRAME DATA BY SHOP PERSONNEL

- - - - - - ESTIMATED TIME FRAME DATA BY SHOP PERSONNEL

Table 4.1 (continued)

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	LOCATION (Bldg. No.) PRESENT	LOCATION (Bldg. No.) PAST	WASTE MATERIAL	WASTE QUANTITY*	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL (50 60 70 80)
23rd EQUIPMENT MAINTENANCE SQUADRON (EMS) (cont'd)					
ARMAMENT SYSTEMS	2108	525	THINNER PD-680 CLEANER SOLVENT MEK ALUMINUM BRIGHTNER	5 GALS./MO. 60 GALS./MO. 30 GALS./MO. 15 GALS./MO. 1-2 GALS./MO.	TO OIL/WATER SEPARATOR
AEROSPACE GROUND EQUIPMENT	2142		ENGINE OIL	175 GALS./MO.	TO CE WASTE TANK; TO STORAGE TANK REMOVED BY CONTRACTOR
			HYDRAULIC FLUID	75 GALS./MO.	TO CE WASTE TANK; DRUMMED TO CONTRACTOR
			TURBINE OIL	40 GALS./MO.	TO CE WASTE TANK; DRUMMED TO CONTRACTOR
			LUBRICATING OIL	40 GALS./MO.	TO CE WASTE TANK; DRUMMED TO CONTRACTOR
			PD-680	55 GALS./MO.	TO OIL/WATER SEPARATOR
WHEEL & TIRE	2502	111	PD-680	110 GALS./4 MOS. (1964 to 1966 - 220 Gals./4 Mos.)	TO OIL/WATER SEPARATOR (corrosion control washrack)
			PAINT STRIPPER (Nonphenolic)	<1 GALS./MO.	TO OIL/WATER SEPARATOR (corrosion control washrack)
23rd SUPPLY SQUADRON					
FUELS LABORATORY	2403	1300 area	JP-4	150 GALS./MO. (prior to 1972 up to 600 Gals./Mo.)	TO CE WASTE TANK (REMOVED BY DPDO CONTRACTOR)

KEY

——— CONFIRMED TIME FRAME DATA BY SHOP PERSONNEL

- - - - - - ESTIMATED TIME FRAME DATA BY SHOP PERSONNEL

Table 4.1 (continued)

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	LOCATION (Bldg. No.) PRESENT	PAST	WASTE MATERIAL	WASTE QUANTITY*	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL (50 – 60 – 70 – 80)
23rd SUPPLY SQUADRON (cont'd)					
HAZARDOUS/RADIOACTIVE STORAGE	1317	1200 area	BAD LOTS, LEAKING CONTAINERS		OFF BASE DISPOSAL (TMO)
23rd AIRCRAFT GENERATION SQUADRON (AGS)					
74th AMU	2502		JP-4	100 GALS./MO.	TO CE WASTE TANK
75th AMU	2102		PD-680	55 GALS/YR.	DRUM TO CONTRACTOR; TO CE WASTE TANK; PUMPED TO CONTRACTOR (DPDO)
76th AMU	2501		HYDRAULIC FLUID	3 GALS/MO.	PUMPED TO CONTRACTOR; TO CE WASTE TANK; PUMPED TO CONTRACTOR (DPDO)
23rd TRANSPORTATION SQUADRON					
BATTERY SHOP	1707 (1981-1982)	2005 (1952-1981)	BATTERY ACID	15 GALS./MO.	NEUTRALIZED TO SANITARY SEWER
VEHICLE MAINTENANCE	1707 (1981-1982)	2005 (1952-1981)	ENGINE OILS	150 GALS./MO.	UNDERGROUND TANK STORAGE CONTRACTOR DISPOSAL OFF SITE
			TCE	110 GALS./MO.	WASTE OIL TANK CONTACT DISPOSAL (TO DPDO CONTRACTOR)
			PAINT THINNER	5 GALS./MO.	CONTRACTOR DISPOSAL OFF SITE
REFUELING MAINTENANCE	2401 (1964-1982)	2005 (1952-1964)	JP-4, AVGAS	100 GALS. MO.	UNDERGROUND TANK (TO DPDO CONTRACTOR)
			WASTE OIL	150 GALS./MO.	ABOVE GROUND TANK (TO DPDO CONTRACTOR)

KEY

——— CONFIRMED TIME FRAME DATA BY SHOP PERSONNEL

- - - - - - ESTIMATED TIME FRAME DATA BY SHOP PERSONNEL

TMO: TRAFFIC MANAGEMENT OFFICE

minor leakage from drum expansion in the past was cleaned up by removing the contaminated sand or gravel base and disposing of the materials in drums. All drums were regularly collected by a contractor for off-site disposal.

The largest waste accumulation point for contract disposal at England AFB is a 6,000 gallon underground tank administered by Civil Engineering located near building 2611 (the hydrant area). The "slop tank" installed in the early 1960's can be used by any of the shops for disposal of wastes. The tank was pumped every six months by a contractor.

Other identified methods of waste disposal were through DPDO, the sanitary sewer and the oil/water separators (most of which are connected to the sanitary sewer).

Shops generating hazardous wastes include eight different squadrons or groups. The 23rd Component Repair Squadron and the 23rd Civil Engineering Squadron have the majority of the shops included in Table 4.1.

Fuels Management

The England AFB Fuels Management storage system includes a number of above ground and underground storage tanks and pipelines located throughout the base. A summary of the major fuel and oil storage capacities is illustrated in Table 4.2. Most fuel at England AFB is stored in aboveground tanks in the POL (bulk storage) area on the northeast side of the base. Most of the JP-4, AVGAS, Diesel Fuel No. 2 and MOGAS (leaded and unleaded) has been stored on England AFB in this area. The only large underground storage tanks at England AFB are located in the hydrant area (6-50,000 gallon JP-4 tanks) and the motor pool area (4-10,000 gallon MOGAS tanks).

Fuels are delivered to the POL area by both tank trucks and railroad cars. The hydrant area (jet refueling) is supplied from the tank farm by a 10-inch pipeline constructed in 1981. The six 50,000 gallon fueling/defueling underground tanks in the hydrant area are normally kept full. MOGAS (including diesel) is delivered by tank truck to both the POL area and the motor pool. The MOGAS is then transferred to vehicles near the storage tanks.

The POL storage area is a fenced, unpaved bulk storage with containment dikes around each tank. An unlined pit (approximately 30'x30'x2'

TABLE 4.2
SUMMARY OF MAJOR FUEL AND OIL STORAGE CAPACITIES
ENGLAND AFB

Item	No. of Tanks	Maximum Tank Volume (gals)	Minimum Tank Volume (gals)	Total Storage Volume (gals)
JP-4	10	420,000	50,000	1,674,000
AVGAS	1	-------	-------	125,000
MOGAS	7	25,000	10,000	101,000

deep) located in the storage area was used to weather spent fuel filters and sludge from tank cleanouts from November, 1974, until the pit was filled with local soil and graded to natural contours in 1982. The pit (Site D-15, POL Sludge Weathering Pit) was partially filled with ground water at all times. The only non-fuels management use of the weathering pit was a one-time disposal of an unknown quantity of stripped acrylic floor finish that never totally evaporated. Spent fuel filters and sludge are now weathered on the gravel surface near the hydrants. Prior to the 1960's, weathering was also probably conducted next to the hydrants. Fuel filters are removed twice a year and weathered 2 to 4 weeks and then discarded in the dumpster. Tanks are cleaned every 3 years and approximately 7 to 15 gallons of sludge is removed and weathered for each tank.

Spill Areas

Small spills have occurred on England AFB. These spills are generally cleaned up and do not cause significant environmental damage. These include (1) small spills which routinely occurred on the aircraft parking areas as a consequence of fuel expansion in the aircraft fuel tanks, and (2) small spills resulting from overfilling tanks and off-loading trucks.

Several larger fuel spills have also occurred on EAFB, some of which may have the potential for ground-water contamination. The locations of these fuel spill areas are illustrated in Figure 4.1.

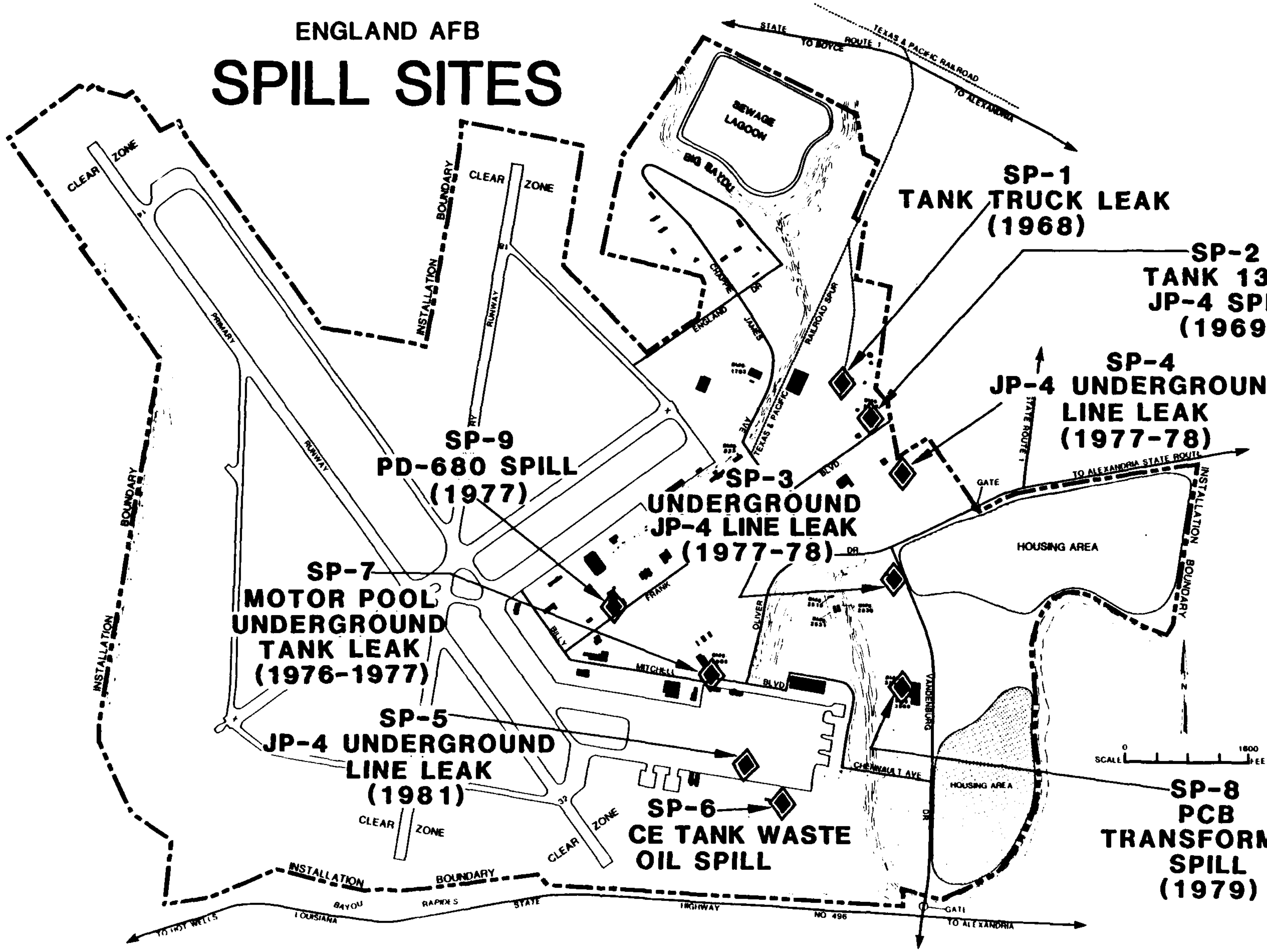
In 1968, a truck off loading line broke in the POL area spilling approximately 1900 gallons of JP-4. (Site SP-1). Most of the fuel was recovered. SP-1 is not considered a potential for contamination migration, due to the minor quantity and location of spill material which was not recovered and the location of the spill.

A second major fuel spill occurred in 1969 at Site SP-2, when JP-4 Tank No. 1319 was accidentally overfilled. Approximately 12,000 gallons of fuel spilled into a drainage ditch and ultimately into the bayou east of Tank 1319. None of this fuel was recovered.

In 1977 or 1978, a line leak occurred (Site SP-3) near the Golf Course Club House. An unknown quantity of JP-4 leaked and flowed into a nearby ditch. The fuel and saturated soil was collected and hauled to the area adjacent to Site D-15 (POL Sludge Weathering Pit) for dewatering

ENGLAND AFB

SPILL SITES



SOURCE: ENGLAND AFB INSTALLATION DOCUMENTS

and disposal. A new line was installed in 1981. The potential for contamination exists at Site SP-3 as a result of the past JP-4 spill, although the majority of JP-4 probably seeped into an adjacent ditch or was recovered.

During 1977-1978, a 1000 gallon JP-4 spill (Site SP-4) also occurred as a result of a line break near building 1500 and the trailer park area. Part of the spilled JP-4 was recovered at this site. Contaminated soil was excavated from Site SP-4 and hauled to Site D-15 and weathered. However, a potential for contamination still exists in this area.

In 1981, a new JP-4 fuel line burst in the same vicinity as Site SP-6 (Site SP-5). Most contaminated soil was collected and hauled to Site D-15, the POL Sludge Weathering Pit. Minor potential for contamination exists at this site due to the past cleanup and removal actions.

A 6,000 gallon underground CE storage tank located near building 2611 (the hydrant area) is the site of several suspected spill incidents (Site SP-6). This "slop tank," first installed in 1972, is used by many of the shops as an accumulation point for waste oils. The tank was pumped out every six months by a contractor who then disposed of the material off-site. Based on a site inspection at the tank and noted discoloration of surrounding soil, spills have occurred in loading and/or unloading the tank. This spillage represents a potential for contamination.

A 10,000 gallon motor pool tank (MOGAS) (SP-7) was replaced in the vicinity of Building 2005 in 1977. The tank was suspected to be leaking. Although no evidence of leakage was observed when the tank was removed, a potential for contamination exists at this site.

In 1979, a PCB transformer leaked onto a concrete pad at the hospital (Site SP-8). The material was carefully collected, drummed and properly stored pending disposal by DPDO. No potential exists for contamination at this site due to the cleanup and removal procedures employed at the time of the spill.

In 1977, approximately 30 gallons of PD-680 was washed into a ditch near Building 500 (Site SP-9), as a result of the one-time use of PD-680 for cleaning the fire engines. The PD-680 was blocked in the ditch using a "hay dam" and cleaned up. Due to the location, quantities of material and cleanup procedures employed at the time of the spill, it is unlikely that this spill created a potential for contamination.

Pesticide Utilization

England AFB has conducted a pest control program since the early 1960's. The program was initially implemented by the Road and Grounds Shop. However, in 1978 the responsibilities for herbicides and other pesticides applications were taken over by the Entomology shop. The pesticide program involves routine and specific job order chemical application and spraying. Pesticides are stored in a locked area of the Entomology shop (Building 1703) (Site S-3) and in a locked storage area (Building 1210) (Site S-2). Appendix B, Table B.2, includes a list of pest control chemicals in stock and/or used during the past year.

Between the 1960's and 1972, all empty pesticide containers were crushed and disposed of by refuse collection. Any rinsewaters generated from equipment cleaning operations or container rinsings were drained to the sanitary sewer. In 1972, new procedures were implemented for handling pesticides. All empty pesticide containers were triple-rinsed and punched with holes prior to disposal with the base general refuse. Rinsewater was flushed to the sanitary sewer. Since 1979, the rinsate was used to formulate pesticide applications.

Interviews with base personnel indicated no knowledge of pesticide spills, or disposal of off-spec or unwanted chemicals in any base landfill. Fourteen 4-pound bags of lead arsenate and two 55-gallon drums of 2,4,5-T, which are currently being stored at Building 1210, are awaiting pick-up by DPDO for off-site disposal. Two 5-gallon cans of 25 percent DDT were disposed of in 1981 through the Defense Property Disposal Office (DPDO) at Fort Polk. This material was also stored in Building 1210 prior to disposal. These materials were all stored on concrete in an enclosed building and no evidence of leakage was reported or observed. Sites S-2 and S-3 are not considered to be areas with potential for contamination.

Fire Training

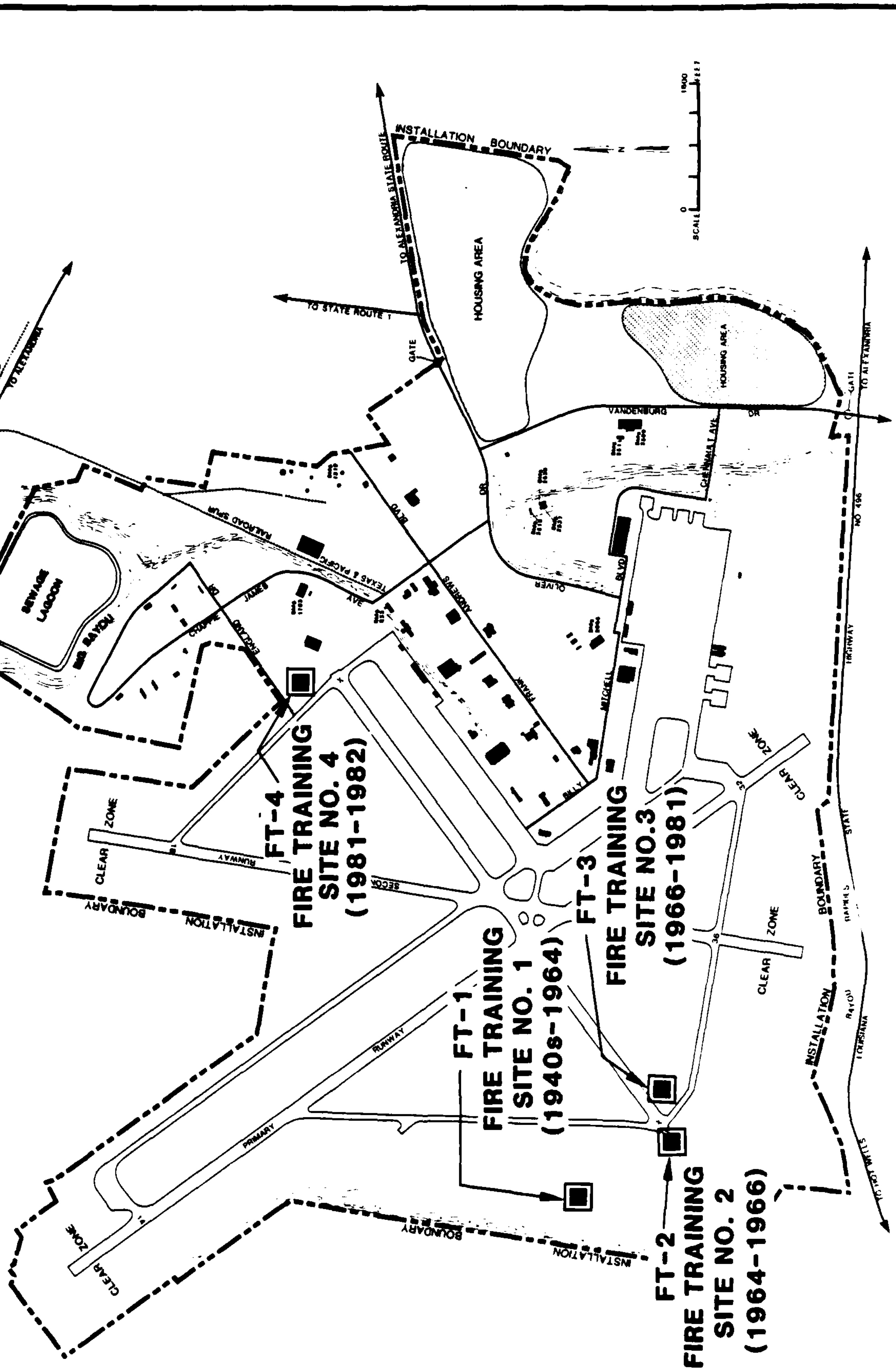
The Fire Department at England AFB has operated four fire training sites at which fires were ignited and then extinguished. Each of the sites is illustrated in Figure 4.2.

FT-1 Fire Training Site No. 1

Site FT-1 was utilized from the early 1940's until 1964 as a fire training area. The site consisted of an approximate 100-foot diameter bermed area, a drum storage site and an old B-29 aircraft. The drum

ENGLAND AFB

FIRE TRAINING AREAS



SOURCE: ENGLAND AFB INSTALLATION DOCUMENTS

storage site was utilized to store 20 to 30 55-gallon drums of contaminated oils and sludges resulting from refueling and aircraft maintenance. The rusty, deteriorated drums were stored on permeable soils. Approximately two times per month, the contaminated waste materials were mixed with JP-4 and placed in a tank within the 100-foot bermed area and ignited. Protein foams were then used to extinguish the fire. Visual examination of the area indicated no obvious remnants on-site, nor evidence of surficial contamination. However, due to the nature of the materials used at the site and since much of the spent material may have seeped into the ground, a potential for contamination exists.

FT-2 Fire Training Site No. 2

Site FT-2 was used as a temporary training site from 1964 to 1966. Fire training was conducted on the overrun of the old runway as shown in Figure 4.2. The site utilized was approximately 75 feet in diameter and contained a 1 1/2 foot berm. Beginning in 1964, only clean JP-4 fuel was used for the fire training exercises. About two times per month, 300 gallons of JP-4 fuel was ignited at the site and extinguished with protein foam. Visual examination of the area revealed a concrete apron and a hanger. No evidence of the training area was apparent.

FT-3 Fire Training Site No. 3

Site FT-3 was used as a fire training area from 1966-1981. The site's size and operational practices were identical to those for Site FT-2. However, the extinguisher agent used at Site FT-3 was primarily AFFF. Visual examination of the area revealed no surficial evidence of residual fuels.

FT-4 Fire Training Site No. 4

Site FT-4 was constructed in 1981 and is currently used as a fire training area. An approximate 75-foot diameter bermed area is utilized for the exercises which are conducted two times per month using about 300 gallons of JP-4 fuel. AFFF is used as the extinguishing agent at this site. Based on a site inspection, no evidence of contamination exists at this site.

DESCRIPTION OF PAST ON-BASE DISPOSAL METHODS

The facilities at England AFB which have been used for the management and disposal of waste can be categorized as follows:

- Waste Storage Sites
- Disposal Sites
- Low-level Radioactive Waste Disposal Sites
- Refuse Incineration
- Sanitary Sewer System
- Oil/Water Separators
- Storm Drainage System.

These waste management facilities are discussed individually in the following sub-sections.

Waste Storage Sites

Several hazardous material and waste storage sites have been located on England AFB. These sites are areas of interest due to their potential environmental contamination and were reviewed during the on-site survey. These sites are illustrated in Figure 4.3 and Figure 4.4 along with several sites discussed under the fuels management and pesticide utilization sections of this report (Site S-2, Site S-3).

Site S-1 / Waste Oil Storage Tank

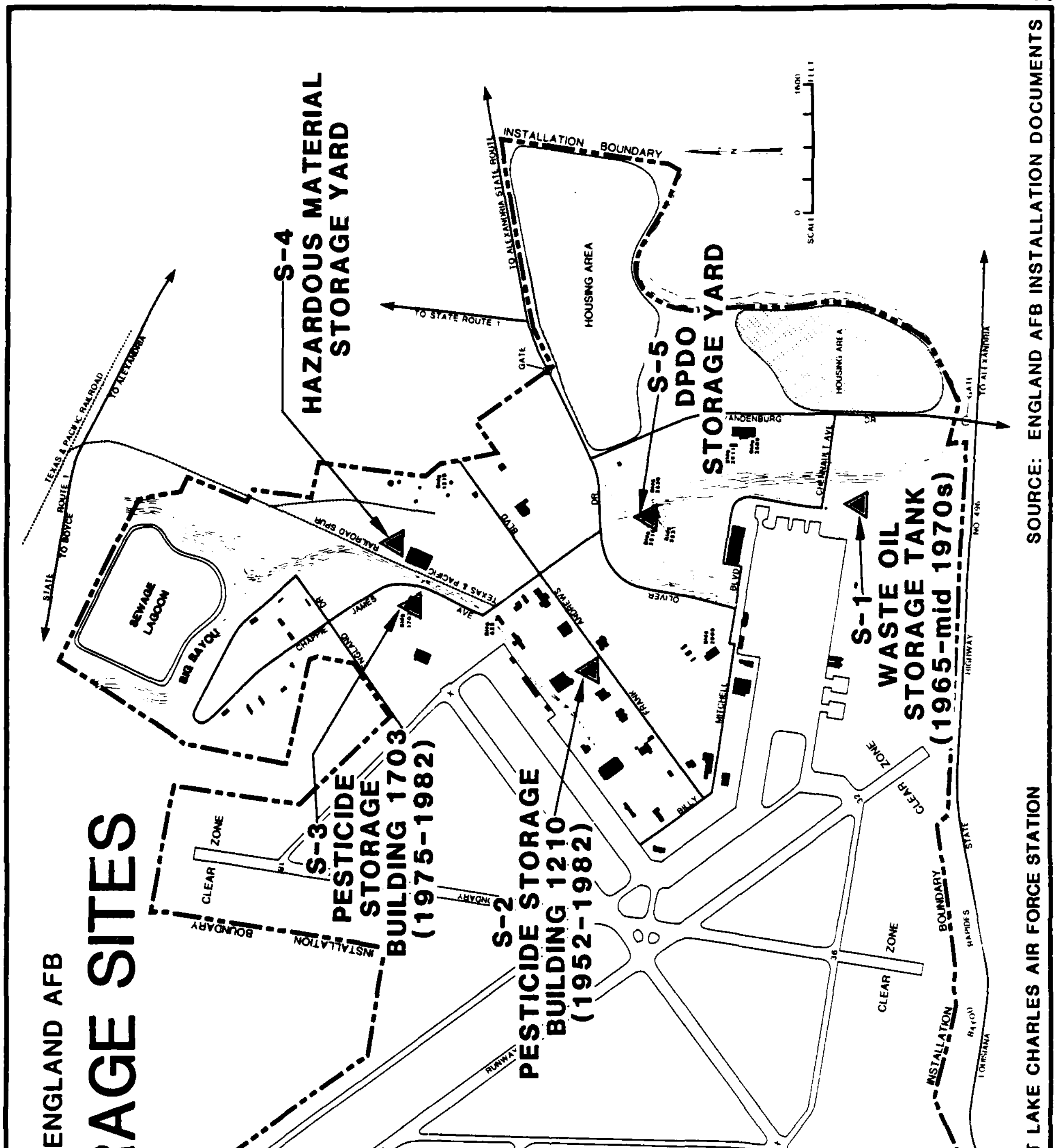
From approximately 1965 until the mid-1970's a 500-gallon underground tank (Site S-1) located near the Horse Stable Area was used to store waste aircraft engine oil (no fuel was disposed of). The oil was collected routinely by a contractor for off-site disposal. According to one personnel interview, numerous small spills occurred while loading and unloading the tank. Visual examination of Site S-1 and surrounding draining ditches during the on-site visit revealed no evidence of the tank site nor evidence of old oil spills. The old site may pose a threat of contamination, as a result of past spillage in the area.

Site S-2 / Pesticide and PCB Transformer Storage Building 1210

In addition to the pesticides stored at Building 1210 (Site S-2), PCB transformers (12) are also stored there. The building has concrete floors with no outlets. No PCB leakage has been observed. Hence, the site does not present a potential for environmental contamination.

Site S-4 / Hazardous Material Supply Storage Yard

Base supply solvents, paint thinners, flammables and other chemical materials have been stored in Building 1317. The materials are stored in a variety of containers and present no potential for contamination, since no spills have occurred.


ENGLAND AFB
STORAGE SITES
S-1 WASTE OIL STORAGE TANK (1965-mid 1970s)
S-2 PESTICIDE STORAGE BUILDING 1210 (1952-1982)
S-3 PESTICIDE STORAGE BUILDING 1703 (1975-1982)
S-4 HAZARDOUS MATERIAL STORAGE YARD
S-5 DPDO STORAGE YARD
SEWAGE LAGOON
BIG BAYOU
HOUSING AREA
HOUSING AREA
INSTALLATION BOUNDARY
CLEAR ZONE
PRIMARY RUNWAY
TEXAS & PACIFIC RAILROAD
RAILROAD SPUR
TO STATE ROUTE 1
TO ALEXANDRIA
TO BOYCE
TO ALEXANDRIA STATE ROUTE
GATE
VANDENBURG DR
CHENNAULT AVE
OLIVER BLVD
MITCHELL BLVD
ANDREWS BLVD
FRANK
BILLY
CHAPPIE JAMES AVE
ENGLAND DR
STATE HIGHWAY NO 496
LOUISIANA
RAPIDES
BAYOU
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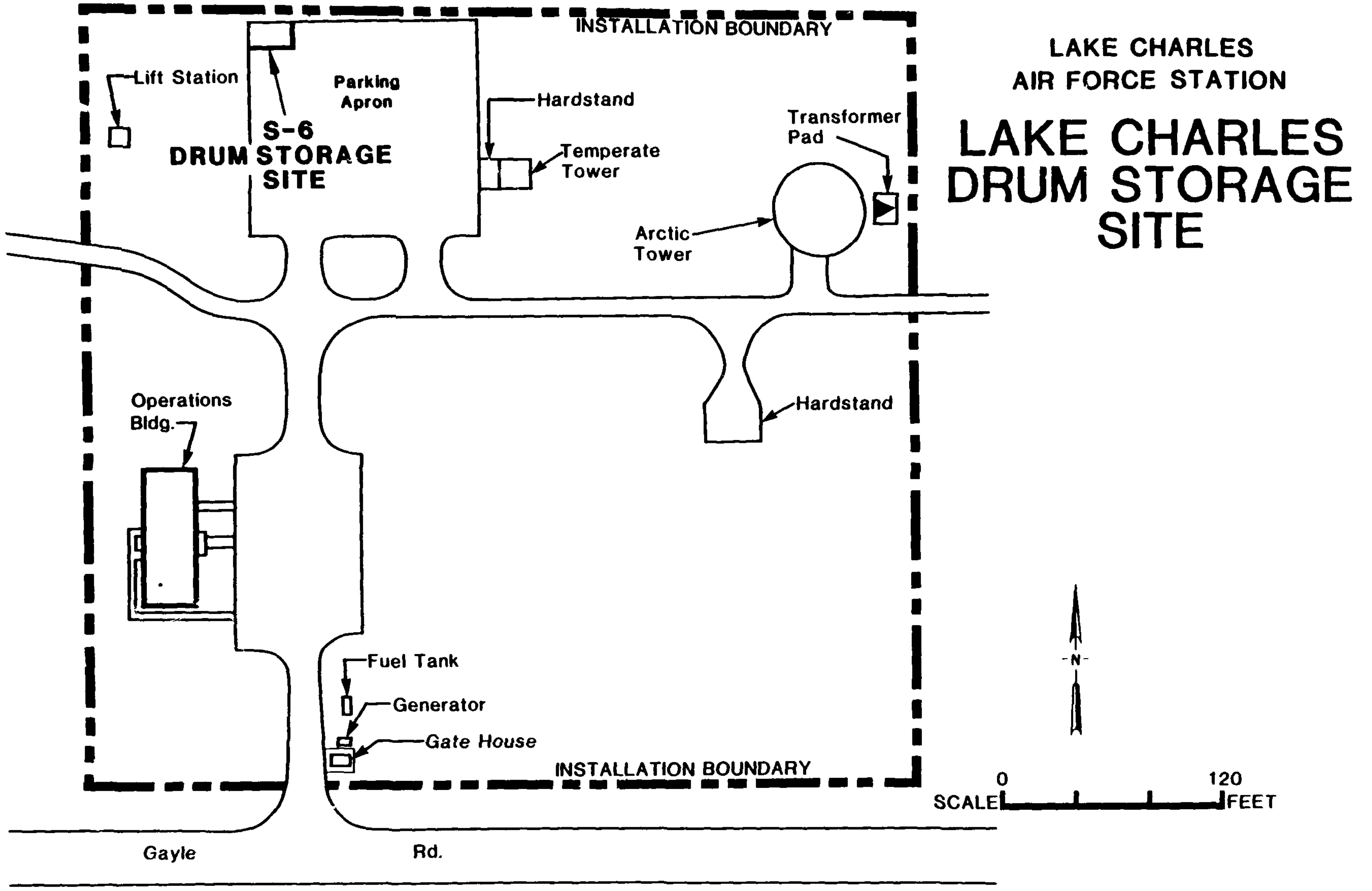
NOTE: SITE S-6 IS LOCATED AT LAKE CHARLES AIR FORCE STATION
SOURCE: ENGLAND AFB INSTALLATION DOCUMENTS

FIGURE 4.4



SOURCE: ENGLAND AFB INSTALLATION DOCUMENTS

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Site S-5 / DPDO Storage Site

The Defense Property Disposal Office (DPDO) (Site S-5), formerly known as Air Force Redistribution and Marketing, has been located in Building 2531 and 2515 since 1978. Since that time, the England AFB DPDO site has functioned as part of the DPDO located at Ft. Polk, Louisiana. Prior to 1978, the site included Building Nos. 2515, 2531 and 2530. Since 1978, Building 2530 has been used for CE storage. Prior to 1978, DPDO at England AFB stored old transformers, flammable materials (in a portable building), expired paints, thinners, and scrap metals and other supplies inside the fenced compound shown on Figure 4.3. No herbicides, expired DDT or other pesticides were stored at this site. Some battery acid was stored in plastic boxes and bags in the early 1970's. Site S-5 is asphalt-paved and contains no evidence of past spillage. According to personnel interviews, minor transformer leakage is likely to have occurred on the asphalt.

Site S-6 / Lake Charles Drum Storage Site

Three to five drums of contaminated waste oil have been stored at Site S-6 on the Lake Charles Radar Site, as illustrated in Figure 4.4. Some overflow from drums has been reported in the past. Although visual examination of the site revealed no evidence of contamination, the site presents a potential for contamination.

Disposal Sites

The majority of general refuse generated from England AFB has been disposed of off-site at the municipal landfill near the Red River or at the Rapides Parish landfill.

Minimal records exist regarding the disposal sites at England AFB. The majority of information regarding these sites was collected through personnel interviews with current and retired employees. A description and evaluation of each site is presented herein. Table 4.3 summarizes pertinent information for each of the disposal sites illustrated in Figure 4.5.

Site D-1 / WWII Bomb Disposal Site

Site D-1, along the railroad tracks between Building Nos. 1316 and 1317, was used as a burial site for deactivated WWII bombs during the late 1940's. Miscellaneous scrap vehicles may have also been disposed of at this site in later years as well. The bomb casings were buried at a

TABLE 4.3
DISPOSAL SITE INFORMATION SUMMARY

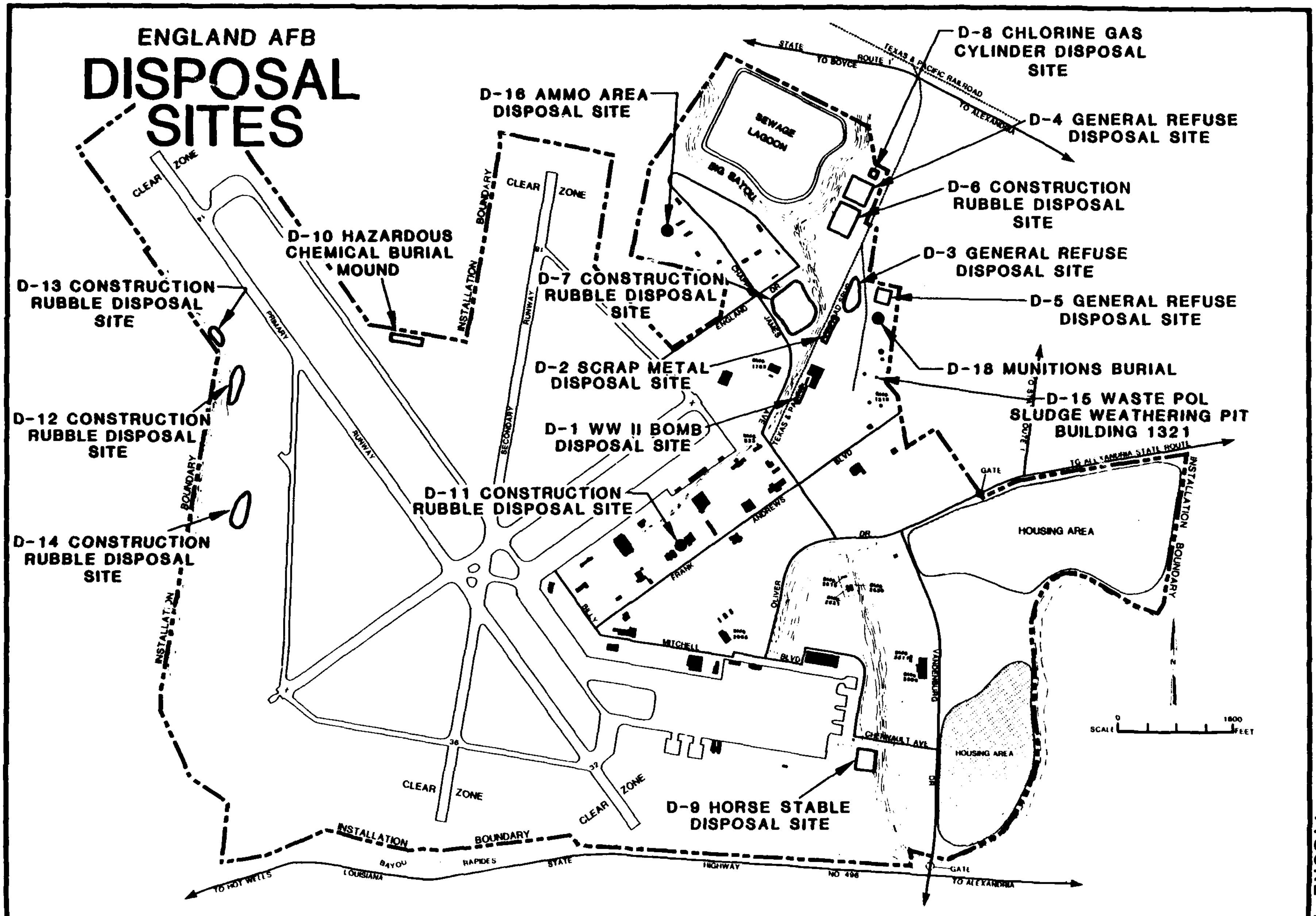
Site	Operation Period	Approximate Size	Types of Wastes	Method of Operation	Closure Status	Surface Drainage	Site Visit Comments
D-1	1940's	<1 acre	WWII deactived bombs	Trench and fill to 10-15' depth	Closed with local soil cover and vegetation	To Big Bayou	No evidence of contamination
D-2	1940's	<0.5 acre	WWII scrap vehicles	Trench and fill to 10-15' depth	Closed with local soil cover and vegetation	To Big Bayou	No evidence of contamination
D-3	1950's	2.5 acres	General refuse, cardboard, hardfill, garbage, empty pesticide containers	Area fill and cover Depth: 10-15'	Closed with local soil cover and vegetation	To Big Bayou	No evidence of contamination
D-4	Late 1950's-Early 1960's	5.5 acres	General refuse, cardboard, hardfill, garbage, empty pesticide containers	Area fill and cover Depth: 10-15'	Closed with local soil cover and vegetation	To Big Bayou	No evidence of contamination
D-5	Early 1960's-Mid 1960's	1.5 acres	General refuse, cardboard, hardfill, garbage, empty pesticide containers	Area fill and cover Depth: 10-15'	Closed with local soil cover and vegetation	To Big Bayou	No evidence of contamination
D-6	1950's-1957	5.5 acres	Construction rubble	Area Fill Depth: 10-15'	Closed with 4' of local soil cover and vegetation	To Big Bayou	No evidence of contamination
D-7	Early 1960's	7 acres	Construction rubble	Area fill Depth: 10-15'	Closed with 4-5' of local soil cover and vegetation	To Big Bayou	No evidence of contamination
D-8	Early 1960's	<1000 S.F.	Chlorine gas cylinders	Pit excavation and fill	Closed with several feet of local soil cover. A warning sign exists near the suspected site.	To Big Bayou	No evidence of contamination
D-9	Unknown-1968	<0.5 acre	Construction rubble remains of B-29 aircraft	Area fill and cover Depth: unknown	Closed with local soil and presently site of a horse stable.	Bayou Rapides	No evidence of contamination

TABLE 4.3
DISPOSAL SITE INFORMATION SUMMARY
(CONTINUED)

Site	Operation Period	Approximate Size	Types of Wastes	Method of Operation	Closure Status	Surface Drainage	Site Visit Comments
D-10	1943-1946	<0.25 acre	Unknown quantity of small containers of WWII chemical agents (gas) (i.e., phosgene)	Buried at old rifle range backstop mound Depth: unknown	Site contains a fence and warning signs	---	No evidence of contamination
D-11	Mid-1960's	<0.1 acre	Construction rubble	Area fill and cover	Closed with local soil cover and new construction is located in area.	To Big Bayou	No evidence of contamination
D-12	1980's	0.25-0.5 acre	Construction rubble	Area fill and cover	Active	To west of installation via Bayou	No evidence of contamination
D-13	1980's	<0.25 acre	Construction rubble	Area fill and cover	Active	To west of installation via Bayou	No evidence of contamination
D-14	1982	0.5-1 acre	Construction rubble	Area fill and cover	Active	To west of installation via Bayou	No evidence of contamination
D-15	1955-1982	900 S.F.	Waste oil and fuel sludge	Evaporation pit Depth: 2'-4'	Filled with local soil materials to natural surface contours.	To east of installation via small drainage ditch into Bayou	No surficial evidence of contamination on adjacent soil nor in the ditch adjacent to the site
D-16	Unknown	<0.1 acre	General hardfill, cardboard boxes, glass	Dump site Depth: unknown	No evidence of dump site exists - assumed covered with local soil and vegetation	To Big Bayou north of site	No evidence of contamination

FIGURE 4.5

ENGLAND AFB DISPOSAL SITES



SOURCE: ENGLAND AFB INSTALLATION DOCUMENTS

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depth of 10-15 feet. The site is currently closed with an unknown depth of local soil cover and contains surficial vegetation. Based on a visual examination, no evidence of leachate, contaminated surface water, or vegetative stress exists at the site. Site D-1 poses no threat of contamination.

Site D-2 / Scrap Metal Disposal Site

Site D-2, which is located northeast of Site D-1, was also used during the 1940's as a burial site for an unknown number of scrap vehicles (jeeps and trucks). The site is closed with several feet of local soil cover. Due to the nature of the materials buried at this location, there is no potential for contamination.

Site Nos. D-3, D-4, D-5 / General Refuse Disposal Sites

Several inactive disposal sites at England AFB (Site D-3, Site D-4 and Site D-5) were used to dispose general refuse, hardfill, and empty pesticide containers from the early 1950's through the mid-1960's. Each site was filled to an approximate depth of 10'-15' and closed with four feet of local soil cover. Based on the recollection of site equipment operators and other base personnel, waste material was filled into the ground-water table. Each of these sites may have contained any material normally disposed in dumpsters by the shop operations. It is possible that the sites contain minor quantities of hazardous shop materials; however, there is no supporting evidence. No surficial evidence of contamination was noted during an inspection at each site. Due to the large size and innocuous nature of wastes disposal at the site, a minor potential for contamination exists at each of these sites.

Site Nos. D-6 and D-7 / Construction Rubble Disposal Sites

Site Nos. D-6 and D-7 were used for construction rubble disposal only. Each site is presently covered with several feet of local soil and contains a cover growth of grass. No visual evidence of contamination exists at these locations. Due to the inert nature of the wastes deposited at these sites, a potential for contamination does not exist.

Site D-8 / Chlorine Gas Cylinder Disposal Site

According to personnel interviews conducted at England AFB, several (8-12) chlorine gas cylinders were buried in the early 1960's at Site D-8 at a very shallow depth (1-2 feet). These cylinders are suspected to have contained chlorine gas when buried. The area (approximately

30'x30') was covered with local soil. At present, the area is covered by natural vegetation and the exact burial point cannot be located. However, a warning sign is posted in the vicinity of the site. This site poses no potential for contamination migration via surface or ground waters, due to the nature of the gaseous material disposed. However, if the cylinders are still full and have not gradually leaked their contents, then a potential for human exposure to chlorine gas exists, since the tanks could be ruptured by people working in the vicinity.

Site No. D-9 / Horse Stable Area Disposal Site

The present Horse Stable Area was apparently used as a construction rubble site in the 1950's through 1968. According to personnel interviews, the site may contain parts of a wrecked B-29 aircraft. Visual examination of the site revealed no evidence of contamination. Due to the innocuous nature of the materials present, contamination at the site is unlikely.

Site No. D-10 / Hazardous Chemical Burial Mound

In the area of an old rifle range backstop mound between the approach end of Runways 32 and 36 (Site D-10), an unknown number of small containers of chemical agents were buried in 1945 or 1946. These containers are believed to be chemical warfare training kits, either M1 or M1A1 Chemical Agent Sampling Kits. These kits were used to teach troops to identify chemical agents under field conditions during WWII.

In 1969, workers digging fill dirt from the abandoned back stop were overcome by an unknown gas. Subsequently, a training kit was found containing several containers labeled HI, HS, PS, CN and DM. These abbreviations represent:

PS: Chloropicrin, a relatively non-toxic vomiting and choking agent;

CN: Chloroacetophenone, a common tear gas;

DM: Adamsite, $NH(C_6H_4)_2$ AsCl, a vomiting agent;

HI: Vessicant of the Mustard Gas Type;

HS: Unidentified Mustard Gas.

Normally the M1 and M1A1 kits also contain phosgene or phosgene and cyanogen chloride (a cyanide). According to base records, the workers were most likely overcome by phosgene.

Apparently, one complete kit was unearthed during the 1969 digging. However, only a small volume of earth had been moved when the gas was discovered. Hence, it would seem unlikely that this was the only burial site in the mound.

The area is presently covered with grass and weeds, fenced and posted with warning signs. The actual location of the containers is unknown. There is no potential for contamination of ground or surface waters, since the materials present are gaseous. The potential exists, however, for localized air contamination if the containers are ruptured. A magnetometer could be used to locate metal containers at this site. However, the very large number of spent shells in the mound would make detection of other containers difficult.

Site Nos. D-11, D-12, D-13, D-14 and D-16 / Construction Rubble Disposal Sites

Site Nos. D-11, D-12, D-13, D-14 and D-16 were used for construction rubble disposal only. No visual evidence of contamination exists at these locations. Due to the inert nature of the materials disposed at these sites, a potential for contamination does not exist.

Site D-15 / POL Sludge Weathering Pit

From approximately 1955 until 1982, a small pit was utilized to "weather" sludge from POL tank cleanouts. The pit was approximately 2 to 4 feet deep and covered an area of about 900 square feet. According to personnel interviews, the ground-water level would often rise above the bottom of the pit. No evidence exists regarding contamination at this location; however, due to the nature of wastes deposited at the site, a potential exists for contamination.

The site was covered with local soil in 1982 and regraded to surface contours.

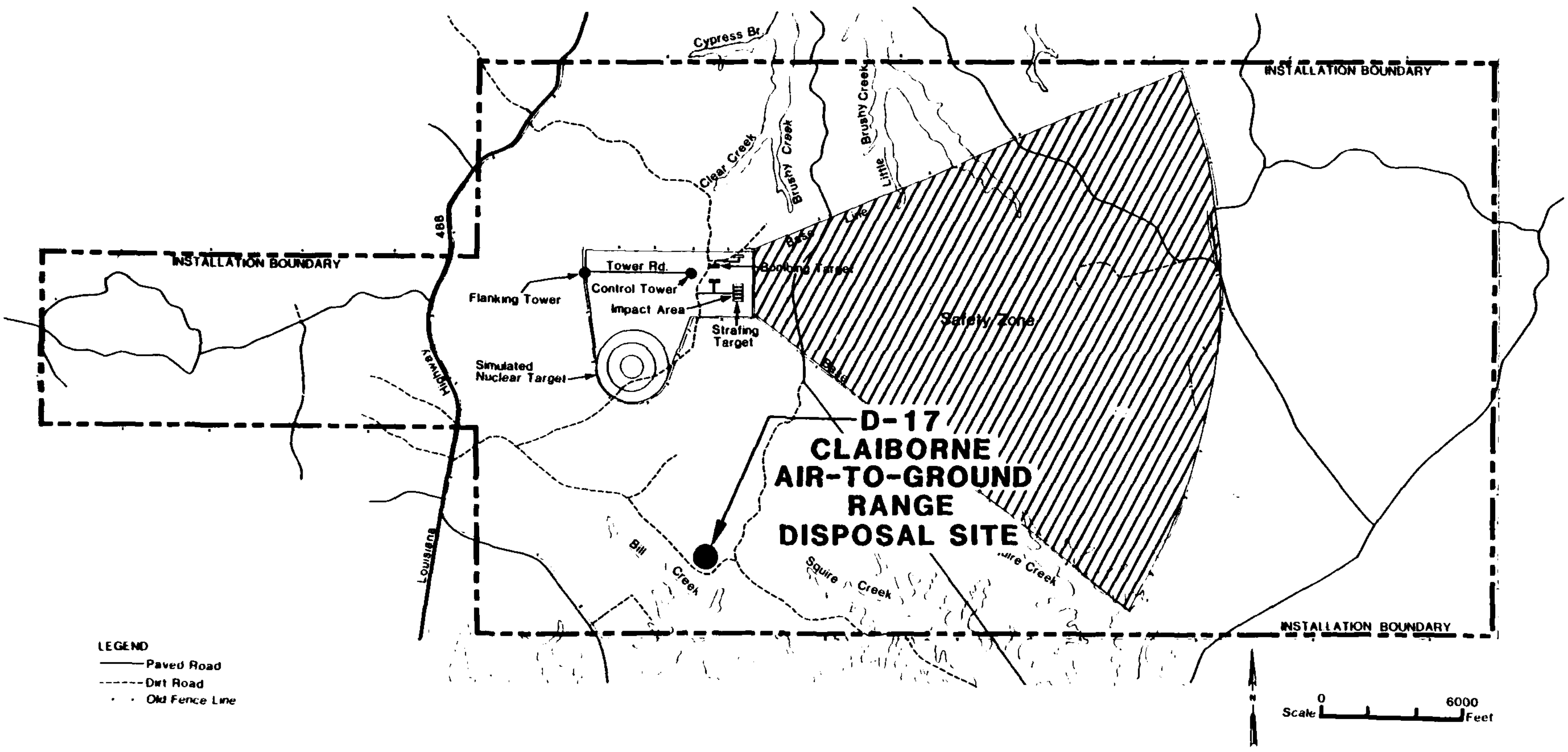
Site D-17 / Claiborne Range Disposal Site

A scrap metal site exists at Claiborne Range as illustrated in Figure 4.6. This site is used to store remains of targets used during practice strafing and bombing maneuvers carried out by England AFB aircraft. Fifty to 100 off-spec 30-gallon paint drums are stored at this location. The containers appeared to be full. Based on visual examination of the area, no potential exists for contamination at the site.

FIGURE 4.6

CLAIBORNE AIR-TO-GROUND RANGE

Claiborne Air-To-Ground Range Disposal Site



SOURCE: ENGLAND AFB INSTALLATION DOCUMENTS

EOD Training Area

Main Base EOD Area

Explosives training has been conducted at Facility 1741 on England AFB. Explosives (2 1/2 pound limit) are detonated in Facility 1741 using blasting caps. Typically, detonating cords, thermite grenades, and 50 caliber cartridges were exploded at this location. Due to the nature of the materials and the enclosed nature of the site, no potential for contamination is expected at the EOD Training Area.

Claiborne Air-to-Ground Range EOD Areas

Detonation, burning and ordnance disposal areas exist on Claiborne Range. One pit is used for burning explosives in a kettle with jet fuel or diesel fuel. Another (4'x10'x4'deep) pit is used for burning unserviceable 30mm ammunition. All fuel is consumed in the burning process. No potential for contamination exists at any of these areas, due to the nature of the materials handled and/or the control procedures utilized.

Low-Level Radioactive Waste Disposal Sites

Two suspected low-level radioactive waste disposal sites exist at England AFB. The sites are illustrated in Figure 4.7 and are discussed below.

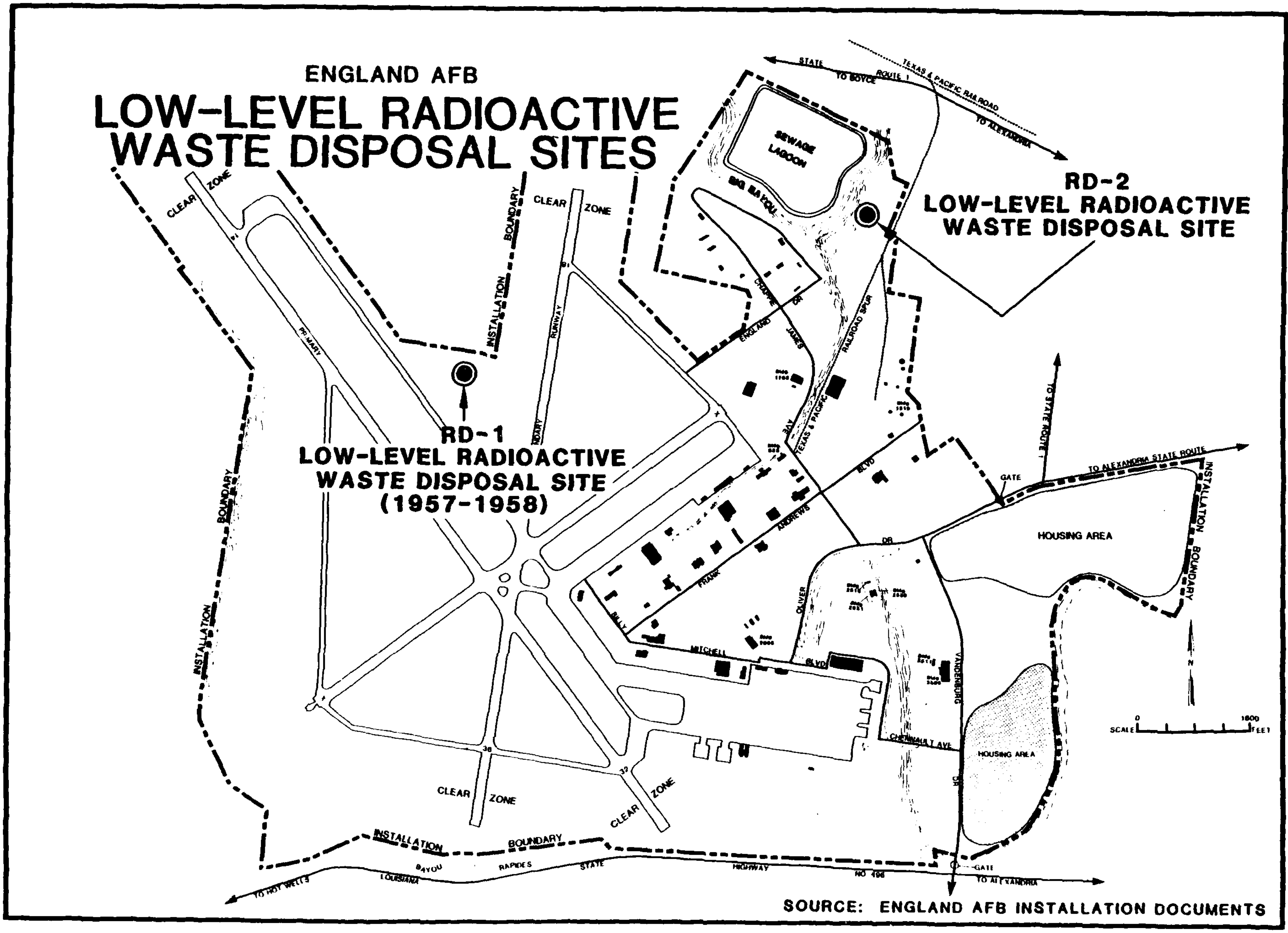
Site RD-1 / Low-Level Radioactive Waste Disposal Site

Low-level radioactive wastes were believed to be buried at Site RD-1 as illustrated in Figure 4.7. The suspected radioactive wastes were believed to be luminous markers from the inside of aircraft and some non-radioactive fluorescent tubes. The materials were buried around 1957-58 at a depth of 4-5 feet and covered with local soil. The site is presently covered with vegetation and surrounded by a marked fence. Based on the types of materials present at the site and its location on the installation, it is unlikely that this site presents a potential for contamination.

Site RD-2 / Low-Level Radioactive Waste Disposal Site

Low-level radioactive waste is also believed to be buried at Site RD-2 shown on Figure 4.7. It is suspected that the radioactive waste is a few electron tubes; however, there is no supporting documentation available. The depth and date of burial at Site RD-2 is unknown. Visual examination of the area revealed no signs of a burial site. Due to the low-level radioactive nature of the suspected wastes, a minor potential for environmental contamination may exist at this location.

FIGURE 4.7



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Site T-1 / Refuse Incineration

According to personnel interviews conducted at England AFB, a refuse incinerator existed at the site of Building 833 during the 1950's (see Figure 4.8). No documentation exists regarding this incinerator, however, it was believed to be a brick and concrete incinerator which burned solely general refuse. General refuse probably was stored near the incinerator during periods of operation. Due to the nature of the materials stored at the site and the removal of the incinerator from the site, no potential exists for contamination at Site T-1.

Sanitary Sewer System

Domestic sewage was treated at numerous septic tanks and drainage fields located throughout the main base prior to 1968. Since 1968, all domestic sewage has been treated in the Sewage Lagoon (Site T-2) (see Figure 4.3). The effluent is discharged under NPDES permit to the Red River. Due to the non-hazardous nature of the wastes disposed in the sanitary sewer system, the septic tank areas and Site T-2 pose no potential environmental contamination concerns.

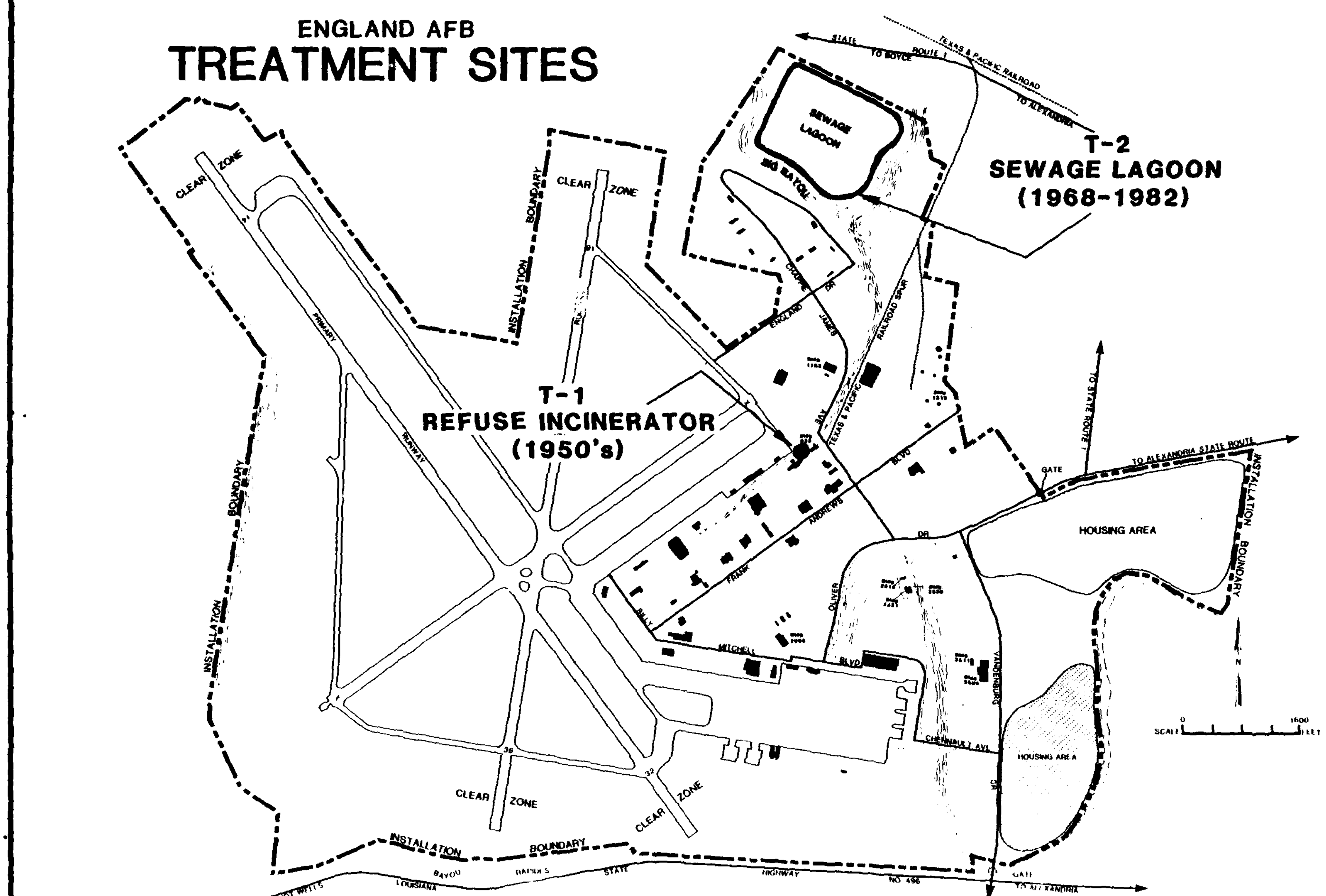
Oil Water Separators

There are eleven oil/water separators located at England AFB. The separators are located at the following locations.

Separator No.	Location
1	Bldg. 2402
2	Bldg. 1434
3	Bldg. 814
4	Fac. 1709
5	Bldg. 2108
6	Fac. 2525
7	Fac. 2606
8	Fac. 1714
9	Fac. 6009
10	Bldg. 120
11	Bldg. 500

The recovered oil from each separator is disposed of by a contractor and the majority of the wastewater enters the sanitary sewer system. There has been at least one instance where some of the separators have overflowed due to pump station overloads and malfunctions. Based on the on-site survey, these units should not pose a potential ground-water contamination hazard as a result of past overflows. The base currently has a program underway to correct the separator overflow problem.

FIGURE 4.8



SOURCE: ENGLAND AFB INSTALLATION DOCUMENTS

Storm Drainage System

Surface runoff in the main base area is channelled off by open ditches. An open outfall canal parallels the rear of the north apron and carries runoff for a portion of both the airfield and shop areas towards the Big Bayou. All collected runoff from the housing areas is discharged to Bayou Rapides. The majority of the storm drainage system in the airfield area consists of 18 and 24-inch concrete pipe. No known problems exist.

EVALUATION OF PAST DISPOSAL ACTIVITIES AND FACILITIES

The review of past operation and maintenance functions and past waste management practices at England AFB has resulted in the identification of sites initially considered as areas of concern with regard to their potential for contamination and migration of contaminants. These sites were evaluated using the Decision Tree Methodology illustrated in Figure 1.1. Those sites which were not considered to have the potential for contamination were deleted from further consideration. Those sites which were considered as having a potential for contamination, as well as a potential for the migration of contaminants, were further evaluated using the Hazard Assessment Rating Methodology (HARM). Table 4.4 identifies the Decision Tree logic questions used for each of the areas of initial concern.

Based on the decision tree logic, 20 of the sites originally reviewed were not considered to warrant further evaluation using the Hazard Assessment Rating Methodology. The rationale for omitting these sites from HARM evaluation is described below.

- Site D-1, WWII Bomb Disposal Site - Non-hazardous nature of deactivated bombs deposited at the site.
- Site D-2 , Scrap Metal Disposal Site - Non-hazardous nature of wastes disposed of at this site.
- Sites D-6, D-7, D-9, D-11, D-12, D-13, D-14, D-16, Construction Rubble Disposal Sites - Inert nature of wastes deposited at the sites.
- Site T-1, Refuse Incineration - No known hazardous materials at this site.
- Site T-2, Sewage Lagoon - Non-hazardous nature of wastes deposited at the sites.

TABLE 4.4
SUMMARY OF DECISION TREE LOGIC FOR AREAS
OF INITIAL ENVIRONMENTAL CONCERN AT ENGLAND AFB

Site No.	Site Description	Potential for Contamination	Potential for Contaminant Migration	Potential for Other Environmental Concerns	Refer to Base Environmental Programs	HARM Rating
FT-1	Fire Training Site No. 1	Yes	Yes	N/A	N/A	Yes
FT-2	Fire Training Site No. 2	Yes	Yes	N/A	N/A	Yes
FT-3	Fire Training Site No. 3	Yes	Yes	N/A	N/A	Yes
FT-4	Fire Training Site No. 4	Yes	Yes	N/A	N/A	Yes
D-1	WWII Bomb Disposal Site	No	No	No	No	No
D-2	Scrap Metal Disposal Site	No	No	No	No	No
D-3	General Refuse Disposal Site	Yes	Yes	No	No	Yes
D-4	General Refuse Disposal Site	Yes	Yes	No	No	Yes
D-5	General Refuse Disposal Site	Yes	Yes	No	No	Yes
D-6	Construction Rubble Disposal Site	No	No	No	No	No
D-7	Construction Rubble Disposal Site	No	No	No	No	No
D-8	Chlorine Gas Cylinder Disposal Site	Yes	Yes	Yes	Yes	Yes
D-9	Horse Stable Disposal Site	No	No	No	No	No
D-10	Hazardous Chemical Burial Mound	Yes	Yes	Yes	Yes	Yes
D-11	Construction Rubble Disposal Site	No	No	No	No	No
D-12	Construction Rubble Disposal Site	No	No	No	No	No
D-13	Construction Rubble Disposal Site	No	No	No	No	No
D-14	Construction Rubble Disposal Site	No	No	No	No	No
D-15	POL Sludge Weathering Pit	Yes	Yes	N/A	N/A	Yes
D-16	Ammo Area Disposal Site	No	No	No	No	No
D-17	Claiborne Air-to-Ground Range Disposal Site	No	No	Yes	Yes	No
T-1	Incinerator	No	No	No	No	No
T-2	Sewage Lagoon	No	No	No	No	No
RD-1	Low-Level Radioactive Waste Disposal Site	Yes	Yes	N/A	N/A	Yes
RD-2	Low-Level Radioactive Waste Disposal Site	Yes	Yes	N/A	N/A	Yes
SP-1	Tank Truck Leak	Yes	No	Yes	Yes	No
SP-2	Tank 1319 JP-4 Spill	Yes	Yes	N/A	N/A	Yes
SP-3	Underground JP-4 Line Leak	Yes	Yes	N/A	N/A	Yes
SP-4	JP-4 Underground Line Leak	Yes	Yes	N/A	N/A	Yes
SP-5	JP-4 Underground Line Leak	Yes	No	N/A	N/A	Yes
SP-6	CE Tank Spill	Yes	Yes	N/A	N/A	Yes
SP-7	Motor Pool Underground Tank Leak	Yes	Yes	No	No	Yes
SP-8	PCB Transformer Spill	No	No	No	No	No
SP-9	PD-680 Spill	Yes	No	Yes	Yes	No
S-1	Waste Oil Storage Tank	Yes	Yes	N/A	N/A	Yes
S-2	Pesticide Storage Building 1210	No	No	Yes	Yes	No
S-3	Pesticide Storage Building 1703	No	No	Yes	Yes	No
S-4	CE Supply Hazardous Storage Yard	No	No	N/A	N/A	No
S-5	DPDO Storage Yard	Yes	No	Yes	Yes	No
S-6	Lake Charles Drum Storage Site	Yes	Yes	N/A	N/A	Yes

- Site SP-1, Tank Truck Leak - The majority of spilled JP-4 was cleaned up.
- Site SP-4, JP-4 Underground Line Leak - The spill was cleaned up.
- Site SP-8, PCB Transformer Spill - Spill was cleaned up.
- Site SP-9, PD-680 Spill - Spill was cleaned up.
- Site S-2, Pesticide Storage - The storage site is properly contained within a building and is situated on a concrete pad.
- Site S-3, Pesticide Storage - The storage site is properly contained within a building and is situated on a concrete pad.
- Site S-4, CE Supply Hazardous Storage Yard - No known waste spillage.
- Site S-5, DPDO Storage Yard - No known waste spillage on the ground.

The remaining 20 sites identified on Table 4.4 were evaluated using the Hazard Assessment Rating Methodology. The HARM process takes into account characteristics of potential receptors, waste characteristics, pathways for migration, and specific characteristics of the site related to waste management practices. The details of the rating procedures are presented in Appendix E. Results of the assessment for the sites are summarized in Table 4.5. The HARM system is designed to indicate the relative need for follow-on action. The information presented in Table 4.5 is intended to determine priorities for further evaluation of the England AFB potentially contaminated areas (Section 5, Conclusions and Section 6, Recommendations). The rating forms for the affected sites at England AFB are presented in Appendix F. Photographs of two key sites are included in Appendix D.

TABLE 4.5

SUMMARY OF HARM SCORES FOR POTENTIAL CONTAMINATION SOURCES

Rank	Site Name	Receptor Subscore	Waste Characterization Subscore	Pathways Subscore	Waste Management Factor	Overall Total Score
1	FT-1 Fire Training Site No. 1	41	72	72	1.0	61
2	D-15 POL Sludge Weathering Pit	40	72	72	.95	58
3	SP-4 Underground JP-4 Line Leak	48	48	72	.95	53
4	SP-5 Underground JP-4 Line Leak	38	48	80	.95	53
5	FT-3 Fire Training Site No. 3	38	48	72	1.0	53
6	SP-3 Underground JP-4 Line Leak	44	48	72	.95	52
7	SP-2 Tank 1319 JP-4 Spill	38	56	72	.95	52
8	S-1 Waste Oil Storage Tank	44	32	81	.95	52
9	D-3 General Refuse Disposal Site	41	40	80	.95	51
10	D-8 Chlorine Gas Cylinder Disposal Site	45	60	N/A	.95	50
11	D-10 Hazardous Chemical Burial Mound	45	60	N/A	.95	50
12	S-6 Lake Charles Drum Storage Site	57	40	59	.95	49
13	FT-2 Fire Training Site No. 2	40	42	72	.95	48
14	FT-4 Fire Training Site No. 4	40	42	70	.95	48
15	D-4 General Refuse Disposal Site	41	40	70	.95	48
16	D-5 General Refuse Disposal Site	41	40	72	.95	48
17	SP-6 CE Tank Spill	38	27	80	.95	46
18	SP-7 Motor Pool Underground Tank Leak	44	32	72	.95	46
19	RD-1 Low-Level Radioactive Waste Disposal Site	41	6	70	.95	37
20	RD-2 Low-Level Radioactive Waste Disposal Site	38	4	70	.95	35

SECTION 5
CONCLUSIONS

SECTION 5
CONCLUSIONS

The goal of the IRP Phase I study is to identify sites where there is the potential for environmental contamination resulting from past waste disposal practices and to assess the probability of contaminant migration from these sites. The conclusions given below are based on the assessment of the information collected from the project team's field inspection, review of records and files, review of the environmental setting, and interviews with base personnel, past employees and state and local government employees. Table 5.1 contains a list of the potential contamination sources identified at England AFB and a summary of HARM scores for those sites.

1) Site FT-1, Fire Training Site (1940's - 1964), has a moderate potential for environmental contamination. Leaking drums of contaminated waste oils, solvents and sludge were stored adjacent to this site prior to burning them during training exercises within the fire burn pit. The depth to ground water is estimated to be less than ten feet. Site FT-1 is less than 500 feet from surface water on the west boundary of the main base. Regional geology indicates the soils are comprised of permeable materials. The area received a HARM score of 61.

2) The POL Sludge Weathering Pit (Site D-15) has a moderate potential for environmental contamination. Between the 1950's and 1982 most POL tank cleaning sludges were deposited in this pit for "weathering" purposes. The bottom of the pit was below the ground-water table for much of the year. The soils in the area are permeable. The site is in close proximity to the eastern installation boundary and a small ditch which drains to Big Bayou. The pit received a HARM score of 58.

TABLE 5.1

PRIORITY RANKING OF POTENTIAL CONTAMINATION SOURCES

Rank	Site No.	Site Name	Date of Operation of Occurrence	Overall Total Score
1	FT-1	Fire Training Site No. 1	1940's - 1964	61
2	D-15	POL Sludge Weathering Pit	1950's - 1982	58
3	SP-4	JP-4 Underground Line Leak	1977 - 1978	53
4	SP-5	JP-4 Underground Line Leak	1981	53
5	FT-3	Fire Training Area No. 3	1966 - 1980	53
6	SP-3	JP-4 Underground Line Leak	1977 - 1978	52
7	SP-2	Tank 1319 JP-4 Spill	1969	52
8	S-1	Waste Oil Storage Tank	1965 - Mid 1970's	52
9	D-3	General Refuse Disposal Site	1950's	51
10	D-8	Chlorine Gas Cylinder Disposal Site	Early 1960's	50
11	D-10	Hazardous Chemical Burial Mound	1945 - 1946	50
12	S-6	Lake Charles Drum Storage Site	? - Present	49
13	FT-2	Fire Training Site No. 2	1964 - 1966	48
14	FT-4	Fire Training Site No. 4	1980 - 1982	48
15	D-4	General Refuse Disposal Site	Late 1950's - Early 1960's	48
16	D-5	General Refuse Disposal Site	Early 1960's - Mid 1960's	48
17	SP-6	CE Tank Spill	1970's - 1980's	46
18	SP-7	Motor Pool Underground Tank Leak	1976 - 1977	46
19	RD-1	Low-Level Radioactive Waste Disposal Site	1957 - 1958	37
20	RD-2	Low-Level Radioactive Waste Disposal Site	Unknown	35

3) Site Nos. SP-3, SP-4, and Sp-5, JP-4 Underground Line Leaks, have a moderate potential for environmental contamination. Various quantities of JP-4 have leaked at each site. The sites received HARM scores of 52, 53 and 53 respectively.

4) Site SP-6, CE Tank Spill, has a moderate potential for contamination. Since 1972, several spills have occurred at the tank during loading and/or unloading of waste oils. The site received a HARM score of 46.

5) The remainder of sites listed in Table 5.1 pose a low potential for environmental contamination.

SECTION 6
RECOMMENDATIONS

SECTION 6

RECOMMENDATIONS

To aid in the comparison of the twenty sites identified in this study with those sites identified in the IRP at other Air Force Installations, a Hazard Assessment Rating Methodology (HARM) was used for prioritizing IRP Phase II studies. Of primary concern at England AFB are those sites with a moderate potential for environmental contamination which are listed in Table 6.1. These sites require further investigation in Phase II. Sites of secondary concern are those with low potential for contaminant migration. No further monitoring is recommended for the other sites with low potential for migration of contaminants unless other data collected indicate a potential problem could exist.

The following recommendations are made to further assess the potential for environmental contamination from past activities at England AFB. The recommended actions are one time sampling and analysis programs to determine if contamination does exist at the site. If contamination is identified the program may need to be expanded to further define the extent of contamination. The recommended monitoring program for Phase II is summarized in Table 6.1.

PHASE II MONITORING RECOMMENDATIONS

1) The Fire Training Site No. 1 (FT-1) is considered to have a moderate potential for environmental contamination. Six soil borings should be advanced in and around the perimeter of the training pit. The borings should be ten feet deep with soil samples collected at regular intervals and at any interface. During the drilling process, an organic vapor analyzer (OVA) should be employed to detect the presence of potential organic contamination. If contamination is not detected by OVA or visual examination, then a water extraction process should be performed on the soil samples and the resulting extract analyzed for the parameters listed in Table 6.2. If observations made during the soil boring collection indicate that contamination is present, then a ground-water monitoring system should be installed consisting of four wells placed

TABLE 6.1
RECOMMENDED MONITORING PROGRAM FOR PHASE II
ENGLAND AIR FORCE BASE

Site	Rating Score	Recommend Monitoring	Comments
1) FT-1 Fire Training Site No. 1	61	a) Collect six soil borings in and around the burn pit. Borings should be ten feet deep with soil samples taken at regular intervals and at any interface. If no obvious contamination is observed during soil boring (i.e., OVA analysis or visual examination), then, water extraction analysis should be performed on the soil samples which should subsequently be analyzed for the parameters in Table 6.2. The bore holes should be refilled with clay to prevent infiltration to the shallow groundwater aquifer.	a) If observations made during the soil boring collection (OVA analysis or visual examination) indicate that contamination is present, than a groundwat water monitoring system should be installed consisting of four wells placed around the pit area, using as many so boring locations as feasible. b) Four surface water and four sediment samples should be collected in the bayou several hundred feet west of t site near the installation boundary. The samples should be analyzed for parameters listed in Table 6.2.
2) D-15 POL Sludge Weathering Pit	56	a) Perform surface geophysical survey to map subsurface zones in the immediate area around pit.	a) Based on results of th surface geophysical survey, install four monitoring wells (in the contaminated area. at the edge of the plume and upgradient . Wells should be constructed of Schedule 4 PVC pipe, screened int the uppermost extent o the saturated zone. Sample wells and analyze for floating material, TOC, and oil and greas b) Collect upstream, mid-site, and downstre sediment samples from the storm water ditch and analyze for TOC, and oil and grease.
3) SP-3, JP-4 Underground Tank Leak		Conduct surface geophysical monitoring (Electrical resistivity) at each site to determine if subsurface contamination is suggested by significant resistivity contrasts.	
4) SP-4, JP-4 Underground Line Leak			
5) SP-5, JP-4 Undergroune Line Leak			
6) SP-6, CE Tank Spill			

TABLE 6.2
RECOMMENDED LIST OF ANALYTICAL PARAMETERS[1]

Site FT-1 Fire Training Site[1]

Total organic carbon
pH[2]
Copper
Zinc
Manganese
Oil and Grease
Nickel
Cyanide
Phenol
PCB
Total dissolved solids[2]
Interim Primary Drinking Water Standards (selected list)

Arsenic	Lead	Endrin	2,4,5-TP Silvex
Barium	Mercury	Lindane	2,4-D
Cadmium	Selenium	Methoxychlor	
Chromium	Silver	Toxaphene	

Site D-15 POL Sludge Weathering Pit[1]

Total organic carbon
Oil and Grease
Floating material (visual observation)
Zinc
Lead
Cadmium
Chromium
Arsenic
Mercury
Selenium
Silver
Nickel
Copper

(1) All analyses will be conducted in accordance with: "Methods for Analyses of Water and Wastes - Environmental Monitoring and Support Laboratory. Office of Research and Development. USEPA. EPA 600/4-78-020. March, 1979.

(2) These analyses will not be performed on soil or sediment analyses.

around the pit area using as many soil boring locations as feasible. The bore holes should be refilled with betonite scurry to prevent infiltration to the shallow ground-water aquifer. In addition, four surface water and sediment samples should be collected in the bayou several hundred feet west of the site near the installation boundary. The samples should be analyzed for the parameters listed in Table 6.2.

2) The POL Sludge Weathering Pit (D-15) also has a moderate potential for environmental contamination and monitoring of this area is recommended. The upper strata of soils in this area is believed to be moderately permeable and shallow ground water can be found at depths of 3-4 feet. In order to make a preliminary determination of the severity and extent of fuel and oil contamination, it is recommended that surface geophysical methods (electrical resistivity) be used to map the subsurface zones in the immediate area of the site. Based on the results from this preliminary survey, four monitoring wells should be installed in order to obtain ground-water samples in the contaminated zone, at the edge of the plume and upgradient of the plume. The monitoring system should consist of PVC schedule 40 wells screened to intercept inflow at the uppermost extent of the saturated zone. Samples from the wells should be inspected for floating material (fuels), and analyzed for oil and grease, and total organic carbon (TOC). Sediments in the storm ditch upstream, mid-site and downstream of the site should be sampled and analyzed for and oil and grease.

3) Several JP-4 spill areas and potential JP-4 tank leak areas exist at England AFB which were considered moderate potential for contamination migration. These sites should be monitored using electrical resistivity monitoring at the same time surface geophysical methods are utilized at Site D-15 during the Phase II effort. The sites recommended for this level of testing include:

Site	Rating
SP-4 JP-4 Underground Line Leak	53
SP-5 JP-4 Underground Line Leak	53
SP-3 JP-4 Underground Line Leak	52
SP-6 CE Tank Spill	46

RECOMMENDED GUIDELINES FOR LANDUSE RESTRICTIONS

The recommended guidelines for future landuse restrictions on each of the twenty sites are presented in Table 6.3. An item-by-item description of these guidelines is represented in Table 6.4.

TABLE 6.3

RECOMMENDED GUIDELINES FOR FUTURE LAND USE RESTRICTIONS AT POTENTIAL CONTAMINATION SITES

Site Name	Recommended Guidelines for Future Land Use Restrictions											
	Construction on the site	Excavation	Well construction on or near the site	Agricultural use	Silvicultural use	Water infiltration (run-on, ponding, irrigation)	Recreational use	Burning or ignition source	Disposal operations	Vehicular traffic	Material storage	Housing on or near the site
FT-1, Fire Training Site No. 1	X	X	X	X		X	X		X		X	X
D-15, POL Sludge Weathering Pit	X	X	X	X		X	X		X		X	X
SP-4, JP-4 Underground Line Leak			X	X		X	X	X	X			
SP-5, JP-4 Underground Line Leak			X	X		X	X	X	X			
SP-3, JP-4 Underground Line Leak			X	X		X	X	X	X			
SP-6, CE Tank Spill			X	X		X	X	X	X			
FT-3, Fire Training Site No. 3	X	X	X	X		X	X		X			X
SP-2, Tank 1319 JP-4 Spill			X	X		X	X	X	X			
S-1, Waste Oil Storage Tank			X	X		X	X		X			
D-3, General Refuse Disposal Site	X	X	X	X		X	X		X		X	X
D-8, Chlorine Gas Cylinder Disposal Site	X	X	X	X		X	X		X			X
D-10, Hazardous Chemical Burial Mound	X	X	X	X		X	X		X			X
FT-2, Fire Training Site No. 2	X	X	X	X		X	X		X			X
S-6, Lake Charles Drum Storage Site			X	X		X	X		X			
FT-4, Fire Training Site No. 4	X	X	X	X		X	X		X			X
D-4, General Refuse Disposal Site	X	X	X	X		X	X		X		X	X
D-5, General Refuse Disposal Site	X	X	X	X		X	X		X		X	X
SP-6, CE Tank Spill			X	X		X	X	X	X			
SP-7, Motor Pool Underground Tank Leak			X	X		X	X	X	X			
RD-1, Low-level Radioactive Waste Disposal Site	X	X	X	X		X	X		X			X
RD-2, Low-level Radioactive Waste Disposal Site	X	X	X	X		X	X		X			X

TABLE 6.4
DESCRIPTION OF GUIDELINES FOR LAND-USE RESTRICTIONS

Guideline	Description
Construction on the site	Restrict the construction of structures which make permanent (or semi-permanent) and exclusive use of a portion of the site's surface.
Excavation	Restrict the disturbance of the cover or subsurface materials.
Well construction on or near the site	Restrict the placement of any wells (except for monitoring purposes) on or within a reasonably safe distance of the site. This distance will vary from site to site, based on prevailing soil conditions and ground-water flow.
Agricultural use	Restrict the use of the site for agricultural purposes to prevent food chain contamination.
Silvicultural use	Restrict the use of the site for silvicultural uses (root structures could disturb cover or subsurface materials).
Water infiltration	Restrict water run-on, ponding and/or irrigation of the site. Water infiltration could produce contaminated leachate.
Recreational use	Restrict the use of the site for recreational purposes.
Burning or ignition sources	Restrict any and all unnecessary sources of ignition, due to the possible presence of flammable compounds.
Disposal operations	Restrict the use of the site for waste disposal operations, whether above or below ground.
Vehicular traffic	Restrict the passage of unnecessary vehicular traffic on the site due to the presence of explosive material(s) and/or of an unstable surface.
Material storage	Restrict the storage of any and all liquid or solid materials on the site.
Housing on or near the site	Restrict the use of housing structures on or within a reasonably safe distance of the site.

APPENDIX A

PROJECT TEAM QUALIFICATIONS

J. R. Absalon, C.P.G.
W. G. Christopher, P.E.
G. Gibbons
B. L. Thorpe

Biographical Data

JOHN R. ABSALON
Hydrogeologist

PII Redacted

[redacted]

Education

B.S. in Geology, 1973, Upsala College, East Orange, New Jersey

Professional Affiliations

Certified Professional Geologist (Indiana No. 46)
Association of Engineering Geologists
Geological Society of America
National Water Well Association

Experience Record

1973-1974 Soil Testing Incorporated-Drilling Contractors, Seymour, Connecticut. Geologist. Responsible for the planning and supervision of subsurface investigations supporting geotechnical, ground-water contamination, and mineral exploitation studies in the New England area. Also managed the office staff, drillers, and the maintenance shop.

1974-1975 William F. Loftus and Associates, Englewood Cliffs, New Jersey. Engineering Geologist. Responsible for planning and management of geotechnical investigations in the northeastern U.S. and Illinois. Other duties included formal report preparation.

1975-1978 U.S. Army Environmental Hygiene Agency, Fort McPherson, Georgia. Geologist. Responsible for performance of solid waste disposal facility siting studies, non-complying waste disposal site assessments, and ground-water monitoring programs at military installations in the southeastern U.S., Texas, and Oklahoma. Also responsible for operation and management of the soil mechanics laboratory.

1978-1980 Law Engineering Testing Company, Atlanta, Georgia. Engineering Geologist/Hydrogeologist. Responsible for the project supervision of waste management, water quality assessment, geotechnical, and hydrogeologic studies at commercial, industrial, and government

John R. Absalon (Continued)

facilities. General experience included planning and management of several ground-water monitoring programs, development of remedial action programs, and formulation of waste disposal facility liner system design recommendations. Performed detailed ground-water quality investigations at an Air Force installation in Georgia, a paper mill in southwestern Georgia, and industrial facilities in Tennessee.

1980-Date Engineering-Science. Hydrogeologist. Responsible for supervising efforts in waste management, solid waste disposal, ground-water contamination assessment, leachate generation, and geotechnical and hydrogeologic investigations for clients in the industrial and governmental sectors. Performed geologic investigations at twelve Air Force bases and other industrial sites to evaluate the potential for migration of hazardous materials from past waste disposal practices. Conducted RCRA ground-water monitoring studies for industrial clients and evaluated remedial action alternatives for a county landfill in Florida. Conducted quality management, hydrogeologic and ground-water quality programs for the pulp and paper industry at several mills located in the Southeast United States.

Publications and Presentations

"An Investigation of the Brunswick Formation at Roseland, NJ," 1973, with others, The Bulletin, Vol 18, No. 1, NJ Academy of Science, Trenton, NJ.

"Engineering Geology of Fort Bliss, Texas," 1978, coauthor: R. Barksdale, in Terrain Analysis of Fort Bliss, Texas, US Army Topographic Laboratory, Fort Belvoir, VA.

"Geologic Aspects of Waste Disposal Site Evaluations," 1980, with others, Program and Abstracts AEG-ASCE Symposium on Hazardous Waste Disposal, April 26, Raleigh, NC.

"Practical Aspects of Ground-Water Monitoring at Existing Disposal Sites," 1980, coauthor: R.C. Starr, Proceedings of the EPA National Conference on Management of Uncontrolled Hazardous Sites, HMCRI, Silver Spring, MD.

"Improving the Reliability of Ground-Water Monitoring Systems," 1981, Proceedings of the Madison Conference of Applied Research and Practice on Municipal and Industrial Waste, University of Wisconsin-Extension, Madison, WI.

John R. Absalon (Continued)

Ground-Water Monitoring Workshop, 1982. Presented to Mississippi Bureau of Pollution Control, Jackson, 15-17 February.

Ground-Water Monitoring Workshop, 1982. Presented to Alabama Division of Solid and Hazardous Waste, Huntsville, 20-21 July.

Ground-Water Monitoring Workshop, 1982. Presented to Kentucky Waste Management Division, Bowling Green, 27-28 July.

"Identification and Treatment Alternatives Evaluation for Contaminated Ground Water," 1982, coauthor: M. R. Hockenbury. Presented to Association of Engineering Geologists Symposium on Hazardous Waste Disposal, Atlanta, 17 September.

"Preliminary Assessment of Past Waste Storage and Disposal Sites," 1982, coauthor: W. G. Christopher. Presented to Association of Engineering Geologists Symposium on Hazardous Waste Disposal, Atlanta, 17 September.

Biographical Data

WILLIAM GARY CHRISTOPHER

Environmental Engineer

PII Redacted

[redacted]

Education

B.S.C.E. in Civil Engineering, (Magna Cum Laude), 1974
West Virginia University, Morgantown, W.Va.
M.E. in Environmental Engineering, 1975, University of Florida, Gainesville, Florida

Professional Affiliations

Registered Professional Engineer (Georgia No. 11886)
American Society of Civil Engineers (Associate Member)
West Virginia Water Pollution Control Federation

Honorary Affilitations

Chi Epsilon
Tau Beta Pi
EPA Traineeship for Master's Degree

Experience Record

1972-1974 West Virginia Department of Highways. Morgantown, West Virginia. Highway Co-op Technician. Handled inspection of drainage, concrete structures, earthwork and compaction testing for interstate highway construction within Monongalia County and Preston County. Performed field office assignments to finalize estimates and quantities for a completed section of highway construction.

1975-1977 Union Carbide Corporation, Chemicals and Plastics Division, Environomental Engineering Department. As a process/project engineer performed environmental protection engineering for Union Carbide's Taft and Texas City Plants. Projects included process design of a rapid mix-flocculation basin for the Gulf Coast Waste

William Gary Christopher (Continued)

Disposal Authority (GCWDA) 40-Acre Facility Treatment Plant. Performed bench-scale studies of coagulant use to improve settling of aeration basin effluent biosolids at the 40-acre facility. Predicted 40-acre facility effluent BOD and effluent TSS quality following operation changes to the existing facility including addition of a limited aeration basin to the front end of the treatment plant. Performed process feasibility and conceptual design of an aeration treatment facility for Union Carbide's Texas City plant concentrated waste stream. Performed preliminary process scope and cost appraisals for sludge disposal alternatives at Texas City including: landfarming, pressure filtration-landfill and pressure filtration-incineration. Performed settling column studies for solvent vinyl resin and suspension vinyl resin waste streams and sized settling basins from the studies. Proposed bench-scale study of the effect of ethyleneamines waste stream on anaerobic treatment of Texas City concentrated wastes. Provided review assistance for a 200-acre regional industrial landfill, in-place stabilization processes for 18-acre lagoons of primary sludge and pyrolysis fuel oil mixtures at Texas City, and source reduction projects. Evaluated at UNOX compressor piping modification for the Taft Plant to reduce power consumption by 50%. Wrote preliminary operational considerations for a proposed GCWDA regional landfarm.

1977-Date Engineering-Science, Inc. Project Engineer on study for the American Textile Manufacturers Institute and EPA. Responsible for field pilot plant study and evaluation of coagulation/clarification/multi-media filtration, carbon adsorption, ozonation, coagulation/multi-media filtration and dissolved air flotation technologies for treatment of textile industry "BPT" effluents to meet future BATEA guidelines. An ancillary portion of this project included review of existing activated sludge facilities and operational practices to meet current "BPT" limits at 5 textile mill sites.

Project engineer on study for Lederle Laboratories, Pearl River, New York plant. Responsible for wastewater treatment plant evaluation and optimization study with particular emphasis on operational changes to improve performance. Treatment processes included coagulation, flocculation, primary sedimentation, oxygen activiated sludge and final sedimentation.

William Gary Christopher (Continued)

Project manager of waste treatment operations evaluation at a pharmaceutical plant. Responsibilities included operational optimization of the full-scale activated sludge process with full-scale coagulation testing, bench-scale bioreactor studies and equalization mixing and capacity studies.

Project engineer on study to determine the impact of RCRA regulations on the coal-fired utility industry. Assisted in development of design criteria and cost methodology and estimates to compare the cost impact of RCRA 3004 and 4004 regulations on fly ash, bottom ash and FGD sludge disposal on a regional and nationwide basis.

Project Manager for review of a Permit Application and design for a proposed Hazardous Waste Disposal Facility in North Carolina.

Project Manager for preparation of a "white paper" for the Department of Energy to assess major impacts of proposed RCRA 3001, 3004 and 3006 regulations on industrial coal use for power generation.

Project Manager on study to determine biotreatability of new process wastes for a pharmaceutical chemical plant and to evaluate and define options for liquid waste incineration.

Project Manager on odor control study of process wastes for a major organic chemicals company. Responsible for laboratory bench-scale and field pilot plant study involving evaluation of liquid waste, air and steam stripping, chemical oxidation, ozonation, and activated carbon adsorption. Design criteria for a biological treatment system for the odor pretreatment effluent was also developed from bench-scale bioreactor studies.

Project Manager on a study to provide a preliminary evaluation of advanced waste treatment technologies required for upgrading an existing activated sludge facility treating organic chemical and pharmaceutical wastes with high COD and nitrogenous concentrations.

Project Manager on a biological treatability study to provide expanded waste treatment facilities for a major organic chemicals firm. Responsibilities included laboratory bench-scale and pilot scale treatability and sludge handling studies involving waste characterization, activated sludge treatability, aerobic digestion, gravity thickening, dissolved air flotation, belt filter press sludge dewatering, plate and frame pressure

William Gary Christopher (Continued)

filter, vacuum filter (rotary precoat), and centrifugation for nine different raw waste streams.

Project Manager for a project involving process selection and preliminary engineering design for a pulp and paper mill waste treatment facility.

Project Manager on Solid and Hazardous Waste study for a diverse chemicals and plastics production facility. Responsibilities included RCRA Interim Status Compliance, RCRA Manifest Implementation and plant training, RCRA Notification and Permit Part A applications. Detailed Solid Waste inventories by production unit and classification of wastes according to RCRA were developed. Segregation of wastes, recycle/recovery and ultimate disposal options including incineration and secure landfills were evaluated for the short-term. Long-term evaluations will be considered in Phase II of the Study.

Project Manager on Solid and Hazardous Waste study for a diverse organic chemicals manufacturing facility. Long-term alternatives for storage, handling, treatment and disposal of a variety of types of hazardous wastes were evaluated based on technical performance and economic comparisons. Alternatives evaluated included solid and liquid incineration, landfill, landfarm, solidification/fixation, and physical volume reduction (shredding,compaction). Developed a detailed Spill Control and Best Management Practices Manual.

Project Manager for a waste treatment plant capacity evaluation for a silicon wafer manufacturing facility. Bench-scale and pilot scale coagulation and settling column studies were performed in addition to field scale oxygen transfer tests to predict maximum design organic and hydraulic loadings for an existing activated sludge waste treatment facility.

Project manager for a biological treatability study to determine the optimum conditions (temperature and hydraulic residence time) for removal of a specific organic currently produced at a chemical production facility.

Project manager for five Installation Restoration Programs (IRP) Phase I projects for the U.S. Air Force (Kelly AFB, Eglin AFB, Duluth AFB, Hancock AFB, DESC). Each of these projects utilized a project team of various disciplines (geology, chemical engineering, biology, environmental engineering) to assess the potential for environmental contamination migration

William Gary Christopher (Continued)

resulting from past hazardous waste handling, storage, treatment and disposal practices. The project tasks included environmental audits, development of waste inventories and waste classification, assessment of site environmental setting, assessment of past waste handling practices (surface impoundments, landfills, storage areas, fire training areas) and finally priority ranking of sites and recommendations for Phase II groundwater monitoring programs.

Project manager for a preliminary design for upgrading an existing activated sludge facility (175,000 gpd) to accommodate expanded pharmaceutical and chemical production facilities. The modifications included provisions for additional submerged aeration capacity, solids contact clarification and mixed equalization.

Other recent projects include development of the work plan and experimental program for an American Cyanamid Company organic chemical plant primary treatment study, development of design specifications for a pharmaceutical production facility waste treatment plant and mixed liquor coagulation operations assistance for a plastics production waste treatment facility.

Technical Publications

"Magnesium Recovery from a Neutral Sulfite Semi-chemical Pulp and Paper Mill Sludge," Master of Engineering Research Project, University of Florida, Gainesville, Florida 1975.

"Siting Considerations for Hazardous Waste Disposal Facilities," presented at the Georgia Environmental Health Association Conference, Jekyll Island, Georgia, July, 1981. (Co-author T.N. Sargent)

"Hazardous Waste Management," Seminar presented to Capitol Associated Industries, Inc., Raleigh, North Carolina, August 21, 1981

"A Solid and Hazardous Waste Management Program for Industrial Facilities," Industrial Wastes Magazine (publication pending), 1982.

"Ground-Water Monitoring" Seminar and Workshop presented to the State of Mississippi, Bureau of Pollution Control, Jackson, Mississippi, February 16-17, 1982. (Co-presentors - J. R. Absalon, E.J. Schroeder).

William Gary Christopher (Continued)

"Ground-Water Monitoring and Sampling" Seminar and Workshop presented to the State of Alabama, Huntsville, Alabama, July 20-21, 1982. (Co-presentors - J. R. Absalon, R. E. McLeod).

"Ground-Water Monitoring and Sampling" Seminar and Workshop presented to the State of Kentucky. Bowling Green, Kentucky, July 27-28, 1982. (Co-presentors - J. R. Absalon, R. E. McLeod).

"Preliminary Assessment of Past Hazardous Waste Storage, Treatment and Disposal Sites" presented to the Association of Engineering Geologists, Atlanta, Georgia, September 17, 198..

Biographical Data
GREGORY M. GIBBONS
Sanitary Engineer

PII Redacted

[redacted]

Education

B.S. in Civil Engineering, 1978, University of Notre Dame
M.S. in Sanitary Engineering, 1980, University of Michigan, Ann Arbor.

Professional Affiliations

Engineering-in-Training (Indiana)
American Society of Civil Engineers
Water Pollution Control Federation

Experience Record

1977-Date — Engineering-Science. Technical Specialist (1977). Responsible for reviewing shop drawings and performing general office duties.

Assistant Engineer (1978). Prepared designs, wrote specifications, and reviewed shop drawings.

Engineer (1979). Responsible for design preparation, pilot plant operation, and data analysis. Also involved in contract administration.

Sanitary Engineer (1980-Date). Responsible for industrial waste survey, characterization and treatability studies, including field surveys, analyses, interviewing and report preparation. Responsible for field investigation and report preparation for sludge land application EIS at Des Moines, Iowa. Assisted in air pollution source tests and compliance determinations at various industrial facilities. Assisted in EIS preparation for wastewater treatment plant in Hanover County, Virginia. Responsible for design of components of 100-mgd Division Avenue Water Treatment Plant (Cleveland, Ohio). Lead responsibility in process design for electroplating waste treatment system. Project Manager for resource recovery assessment of newsprint for the Commonwealth of Virginia.

1978-1979 — University of Michigan, Ann Arbor, Michigan. Laboratory Aide (1978). Teaching Assistant (1979). Responsible for instructing laboratory classes in water quality analysis.

BIOGRAPHICAL DATA

BONNIE L. THORPE
Analytical Chemist

PII Redacted

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Education

A.A.S. in Medical Technology, Minor in Biology, 1974, Corning Community College, Corning, New York

B.S. in Chemistry (Magna Cum Laude), 1977, State University College of New York at Buffalo, Buffalo, New York

M.S. in Chemistry, 1980, Ball State University, Muncie, Indiana

Professional Affiliations

American Chemical Society

Experience Record

1974-1976 Robert Packer Hospital, Sayre, Pennsylvania - Chemistry Laboratory Technician. Performed wet chemical analyses of blood, urine, and fecal specimens. Involved routine analyses such as lipase, biliruben, amalase, and osmosis. Responsible for automated analyses of blood electrolytes. Performed specialized electrophoresis and blood alcohol analyses. Responsible for collecting quality control data and maintaining control charts.

1978-1979 Ball State University, Muncie, Indiana - Graduate Assistant. Responsibilities included preparing chemistry laboratory exercises, instructing and supervising student activities in these laboratories and preparing class lectures. Involved in the upkeep and maintenance of the analytical equipment.

1980-1981 Monsanto Research Corporation, Dayton Laboratory, Dayton, Ohio - Research Chemist. Experience in the application of analytical techniques to environmental, air, and water samples. Includes separation and analysis of organics using GC and capillary GC. Responsible for supervision of information processing on these systems. Determination of trace metals using Atomic Absorption and Inductively Coupled Plasma. Responsible for wet chemical analyses. Functioned as QA/QC coordinator in metals area. Responsible for collecting QC data and maintaining a QC listing on all analyses.

1982-Date Engineering-Science, Inc., Atlanta, Georgia - Analytical Chemist. Involved in the analytical activities for industrial/environmental projects. Experienced in performing analyses and results interpretation of priority pollutants, heavy metals, pesticides, and organic compounds on materials including soils, sludges, water, and wastewater. Analytical expertise includes atomic absorption, gas chromatography, infrared spectrometry, mass spectroscopy and specific ion analyses. Experience also includes all traditional wet chemical techniques. Skilled in the application and interpretation of standard EPA, NIOSH and OSHA methods. She has logged many hours working with ASTM and RCRA procedures for the analyses of hazardous waste. This includes extracting and analyzing wastes for organic and inorganic species, as well as intrinsic properties according to the prescribed RCRA methodologies. (EP toxicity analyses and standard additions.) Typical industrial clients for whom analyses have been performed include:

- Alcoa
- Revlon
- General Battery
- U.S. Army
- Motorola
- EPA

Projects conducted for these clients have included RCRA delisting petitions, RCRA ground water analyses, EP toxicity tests, sludge and soil analyses and wastewater characterization.

APPENDIX B
SUPPLEMENTAL ENVIRONMENTAL SETTING INFORMATION

TABLE B.1

ENGLAND AFB - SUMMARY OF SURFACE WATER QUALITY DATA[a]

Sample Stations (1982 -)		1		2		3		4		5[b]		Inactive		Inactive	
Sample Stations (- 1982)		(1)		(7)		(3)		(4)		(6)		(2)		(5)	
Parameter	Units	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
COD	mg/l	36	60	--	--[c]	51	140	29	60	27	55	312	1680	27	60
TOC	mg/l	14	22	--	--	14	32	10	20	10	18	95	430	10	19
Oil & Grease	mg/l	0.3	0.4	--	--	1.0	4.9	0.9	4.2	0.4	0.7	1.6	5.3	0.4	1.5
Nitrate as N	mg/l	0.3	0.9	--	--	0.2	0.9	0.1	0.2	0.2	0.6	0.2	0.4	0.2	0.7
Nitrite as N	mg/l	0.02	0.4	--	--	<0.02	<0.02	<0.02	<0.02	0.02	0.02	<0.02	<0.02	<0.02	0.02
Cadmium	ug/l	<10	<10	--	--	<10	<10	10	17	11	17	<10	<10	<10	<10
Chromium	ug/l	<50	92	--	--	<50	<50	<50	<50	51	67	<50	<50	<50	<50
Hex Chromium	ug/l	<50	<50	--	--	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Copper	ug/l	832	1974	--	--	1006	1939	981	1974	1045	1851	967	1874	1162	1918
Iron	ug/l	1235	2200	--	--	1838	5100	2112	4950	1651	2500	3764	16250	1811	4800
Manganese	ug/l	302	740	--	--	425	1695	300	520	265	548	888	3315	254	470
Mercury	ug/l	<5	<5	--	--	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Silver	ug/l	<10	<10	--	--	<10	<10	<10	<10	13	40	<10	<10	<10	<10
Zinc	ug/l	410	859	--	--	448	859	432	840	429	783	616	1370	536	832
Chloride	mg/l	18	40	--	--	12	24	11	20	9	24	18	40	11	20
Color	units	51	130	--	--	63	150	64	120	69	200	42	60	61	120
Fluoride	mg/l	0.3	0.6	--	--	0.3	0.6	0.2	0.2	0.2	0.4	0.3	0.5	0.2	0.2
Total Diss. Solids	mg/l	330	523	--	--	308	386	109	164	137	264	484	724	148	299
Sulfate	mg/l	36	80	--	--	24	60	16	32	11	22	35	72	11	20
Surfactants	mg/l	0.3	2.0	--	--	0.2	0.5	0.2	0.5	0.2	0.6	0.4	1.0	0.1	0.2
Turbidity	units	54	100	--	--	48	160	46	120	37	96	67	160	24	54
pH	std units	7.4	8.0	8.9	10.1	7.4	8.0	7.3	8.0	7.7	8.2	7.5	8.0	7.5	8.0
BOD	mg/l			28	67										
Total Susp. Solids	mg/l			67	168										

(a) See Table 3 for sampling station location descriptions, Figure 3.13 for sampling locations.
(b) Sampling period 1979 - present.
(c) Sample location analyzed only for pH, BOD, and total suspended solids. Sampling period 1981 - 1982.

TABLE B.2
ENGLAND AFB
RECENT PESTICIDE USAGE

Common Name	Chemical Name	Estimate of 1981 to 1982 Usage (1bs)
Baygon 1% Baygon Roach Bait 2% Baygon EC 13.9%	Phenyl Methylcarbamate	17
Benefine	Balan	-
BP 300	Pyrethrum	-
Chlordane EC 73%	Octachloro-4,7- Methanotetra	145
Chlordane Dust 6%	Hydroindane	
Daconil 2787 (EC) 54%	Daconil	-
Dalapon 85%	2,2-Dichloropropionic Acid	-
Deltic 21% Dect-off, 71%	Dioxathion (none determined)	4 -
Diazinon EC 48.2% Diazinon dust 2%	P,P-Diethyl-0-(2-Isopropyl-6 Methyl-5-Pyrimidinyl)	35
Diazinon 45	Phosphorothioate	
DSMA (WP) 63%	Disodium Acid Methane Arsenate	-
Ficam W 76%	2-2-Dimethyl-1,3-Benzodioxol- 4-methylcarbamate	12
Kelthane	Kelthane	-
Kovar WP 40%	Bromocil-Diuron	-
Lindane Powder 1%	Gamma-1,2,3,4,5,6- Hexachlorohexane	-
Malathion 95%	0,0-Dimethyl Phosphorodithioate	10

Table B.2
(Continued)

Common Name	Chemical Name	Estimate of 1981 to 1982 Usage (lbs)
Malathion 57%	Ester of Diethyl Mercaptosuccinate	
Malathion Dust		
MSMA EC 47%	Monosodium Acid Methane Arsenate	180
Paraquat CL EC 29.1%	1,1-Dimethyl-4,4'-Bipyridinium (cation) Dichloride	-
Pyrethrins	Pyrethrins	33
Penta	Pentachlorophenol	-
PDB	p-diclorobenzene	5
Roundup EC 41%	N-(Phosphonomethyl)-Glycine (isopropylamine salt)	600
Sevin 80	1-Naphthyl-methyl-Carbamate	4
Talon^{G} 0.005% (Rodenticide)	Talon	18
Ureabor G 98%	Sodium meta-borate	245
Wasp and Hornet Killer	Cycloprane Carboxylate	-
Wipe-out, 11%	2,4-D Dicimba Acid	-

SOURCE: England AFB Entomology Shop Records

APPENDIX C

MASTER LIST OF INDUSTRIAL SHOPS AND LABORATORIES

TABLE C.1
MASTER LIST OF INDUSTRIAL SHOPS AND LABORATORIES

Name	Present Location & Dates	Past Locations & Dates	Handled Hazardous Materials	Generated Hazardous Wastes	Past On-Site Treatment Storage & Disposal Activities
<u>23rd Component Repair Squadron</u>					
Battery/Electric	2502 (1957-1982)	111 (1952-1957)	X	X	Neutralization to Sanitary Sewer
Electronic Warfare	2533	None Recorded			
Weapons Navigation	2527 (1982)				
Welding (Metal Processing)	2502 (1957-1982)	111 (1952-1957)	X		
Non-Destructive Inspection	2528 (1971-1982)	2502 (1957-1971) 111 (1952-1957)	X	X	Turn into DPDO since 1972. Prior wastes to Sanitary Sewer.
Machine Shop	2502 (1957-1982)	111 (1952-1957)			
Environmental Systems	208 (1980-1982)	2502 (1957-1980) 111 (1952-1957)			
Propulsion (Engine Shop)	2102 (1966-1982)	113 (1952-1966)	X	X	Contract Disposal

TABLE C.1 (continued)
Page 2

Name	Present Location & Dates	Past Locations & Dates	Handled Hazardous Materials	Generated Hazardous Wastes	Past On-Site Treatment Storage & Disposal Activities
Survival Equipment	208 (1965-1982)	Near 111 (1952-1957)			
Structural Repair	2502 (1957-1982)	111 (1952-1957)	X		
Avionics (INS, AFC, COMM NAV)	2527 (1961-1982)	2502 (1957-1961)			
PMEL	2527 (1961-1982)	2502 (1957-1961)			
Pneudraulic	2502 (1956-1982)	111 (1952-1957)	X	X	Contract Disposal
Flight Simulator	303 (1964-1982)	1903 (1952-1964)	X		
23rd Civil Engineering Squadron					
Fire Department	500 (1952-1982)		X		
Interior Electric	1703 (1975-1982)	1210 (1952-1975)			

Table C.1 (continued)
Page 3

Name	Present Location & Dates	Past Locations & Dates	Handled Hazardous Materials	Generated Hazardous Wastes	Past On-Site Treatment Storage & Disposal Activities
Protective Coatings	1703 (1975-1982)	1210 (1952-1975)	X		
Entomology	1703 (1975-1982)	1210 (1952-1975)	X	X	To Sanitary Sewer on-site storages turned into DPDO, contract disposal.
Power Production	1703 (1975-1982)	1206 (1952-1975)	X	X	To CE Waste Tank
Engineering Drafting	1205		X		
Sheet Metal/Welding	1702 (1975-1982)	1209 (1952-1975)	X		
Exterior Electric	1703 (1975-1982)	1210 (1952-1975)	X	X	Transformers taken by CES; contract disposal
Heating Shop	1703 (1975-1982)	1210 (1952-1975)	X		
Air Conditioning/Refrigeration	1703 (1975-1982)	1210 (1952-1975)	X		
Carpentry/Masonry	1703 (1975-1982)	1210 (1952-1975)			

Table C.1 (continued)
Page 4

Name	Present Location & Dates	Past Locations & Dates	Handled Hazardous Materials	Generated Hazardous Wastes	Past On-Site Treatment Storage & Disposal Activities
Plumbing	1703 (1975-1982)	1210 (1952-1975)	X		
Pavements	1702 (1975-1982)	1210 (1952-1975)			
Grounds	1702 (1975-1982)	1210 (1952-1975)	X		
<u>23rd Combat Support Group</u>					
Photo Lab	1009 (19[illegible]5-1982)	On Flight Line (Location unknown)	X	X	To Sanitary Sewer Silver Recovery
Claiborne Air-to-Ground Range	Claiborne Air-to-Ground Range (1963-1982)		X	X	Explosives burned in kettle (thermal treatment)
Graphics	1514 (1981-1982)	303 (1964-1981) 1000 (1952-1964)			
Reproduction	1000 (1954-1982)	Behind 1900 (1952-1954)	X		

TABLE C.1 (continued)
Page 5

Name	Present Location & Dates	Past Locations & Dates	Handled Hazardous Materials	Generated Hazardous Wastes	Past On-Site Treatment Storage & Disposal Activities
Small Arms Training	2607 (1955-1982)	None Recorded	X		
Arts & Crafts	1442 (1979-1982)	2605 (? -1979)			
Disaster Preparedness	403 (1976-1982)	900 (1952-1976)			
Auto Hobby	1434 (1976-1982)	1433 (1952-1976)	X	X	Contract disposal, waste tank & oil/water separator
Boat Hobby (Retired 1981)	1433 (1971-1981)	None recorded	X		
<u>23rd Equipment Maintenance Squadron</u>					
Armament Systems	2108 (1973-1982)	525 (1952-1973)	X	X	To oil/water separator
Explosives Ordnance Disposal	814 (1981-1982)	208 (1980-1981) 802 (1970-1980)	X		
Corrosion Control	2502 (1956-1982)	111(?) (1952-1956)	X	X	Contract disposal oil/water separator

TABLE C.1 (continued)
Page 6

Name	Present Location & Dates	Past Locations & Dates	Handled Hazardous Materials	Generated Hazardous Wastes	Past On-Site Treatment Storage & Disposal Activities
Armament Loading Assembly	834 (1980-1982)	525 (1952-1973)	X		
Egress	525 (1977-1982)	2502 (1957-1977)			
Fuel Systems	814 (1966-1982)	525 (1952-1966)	X	X	Reused by POL or used by Fire Dept.
Aerospace Ground Equipment	2142 (1952-1982)		X	X	Contract disposal, oil/water separator
Phase Maintenance	2502 & 2102 (1958-1982)				
Wheel & Tire	2502 (1957-1982)	111 (1952-1957)	X	X	Oil/water separator
Missile/Munition Maintenance	1625 (1965-1982)		X		
USAF Hospital					
Clinical Laboratory	3509 (1969-1982)	1520 (1952-1969)	X	X	To sanitary sewer
Dental Clinic	3509 (1969-1982	1520 (1952-1969)	X	X	To sanitary sewer

TABLE C.1 (continued)
Page 7

Name	Present Location & Dates	Past Locations & Dates	Handled Hazardous Materials	Generated Hazardous Wastes	Past On-Site Treatment Storage & Disposal Activities
Medical X-Ray	3509 (1969-1982)	1520 (1952-1969)	X	X	Silver recovery to sanitary sewer
Miscellaneous Clinics	3509 (1969-1982)	1520 (1952-1969)	X	X	To sanitary sewer
Veterinary Clinics	607 (1982-1983)	2314 (1976-1982)			
23rd Supply Squadron					
Fuels Laboratory	2403 (1971-1982)	1300 Area (1952-1971)	X	X	Return to POL
Cryogenics (LOX)	836 & 835 (1964-1982)		X		
Hazardous/Radioactive Materials Storage	1317 (1973-1982)	Probably 1200 Area	X	X	Dispose of to shops or DPDO
23rd Tactical Fighter Wing					
Data Automation	2313 (1963-1982)	1000 (1952-1963)			
23rd Transportation Squadron					
Battery Shop	1707 (1981-1982)	2005 (1952-1981)	X	X	Neutralization, sanitary sewer

TABLE C.1 (continued)
Page 8

Name	Present Location & Dates	Past Locations & Dates	Handled Hazardous Materials	Generated Hazardous Wastes	Past On-Site Treatment Storage & Disposal Activities
Vehicle Maintenance	1707 (1981-1982)	2005 (1952-1981)	X	X	Contract disposal neutralization, to sanitary sewer.
Paint/Welding	1707 (1981-1982)	2005 (1952-1981)	X	X	Contract disposal.
Allied Trades	1707 (1981-1982)	2005 (1952-1981)	X	X	Contract disposal
Packing & Crating	1315 (1952-1982)				
Refueling Maintenance	2401 (1964-1982)	2005 (1952-1964)	X	X	Contract disposal
1908th Communications Squadron					
Communications Operation Center	1910 (1967-1982)	1904 (1952-1967)	X	X	Evaporation
Transmitter Site	3004 (1979-1982)	3002 (1952-1979)			
Receiver Site	3004 (1954-1982)				
RAPCON	206 (1972-1982)	None recorded	X		

TABLE C.1 (continued)
Page 9

Name	Present Location & Dates	Past Locations & Dates	Handled Hazardous Materials	Generated Hazardous Wastes	Past On-Site Treatment Storage & Disposal Activities
Radio Maintenance	200 (1965-1982)	None recorded	X		
Teletype Maintenance	1910 (1981-1982)	200 (1965-1981)	X	X	Evaporation
Control Tower	107 (1956-1982)				
Weather Maintenance	107 (1956-1982)		X		
Communication Maintenance	200 (1965-1982)	None recorded	X		
Radar Maintenance	206 (1972-1982)	None recorded	X	X	
Message Center/Crypto Maintenance	1910 (1957-1982)	1903 area (1952-1957)	X		

(1) Hazardous waste according to CERCLA or a potentially hazardous waste (one which was suspected of being RCRA hazardous although insufficient data was available to fully characterize the waste).
(2) Past treatment, storage, and/or disposal activities - present activities are covered under RCRA.
(3) None recorded indicates that available records or documentation indicated no past building locations existed.

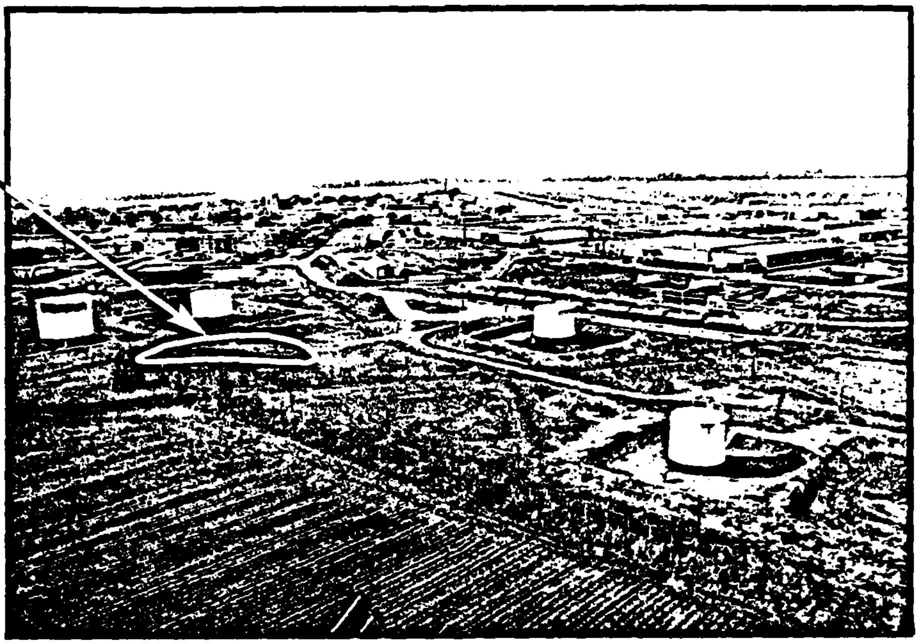
APPENDIX D
SITE PHOTOGRAPHS

APPENDIX D

TABLE OF CONTENTS

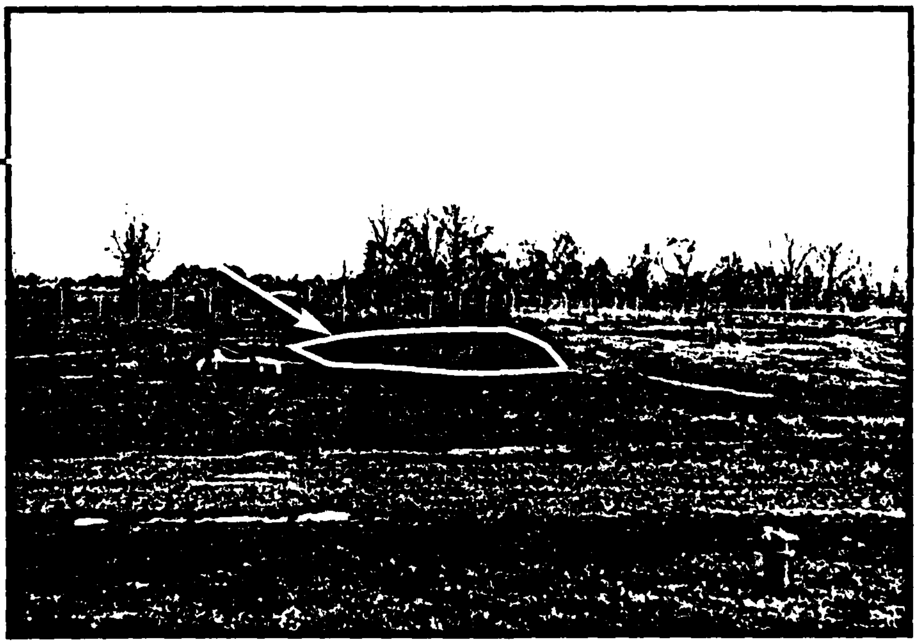
ENGLAND AFB

SITE D-15



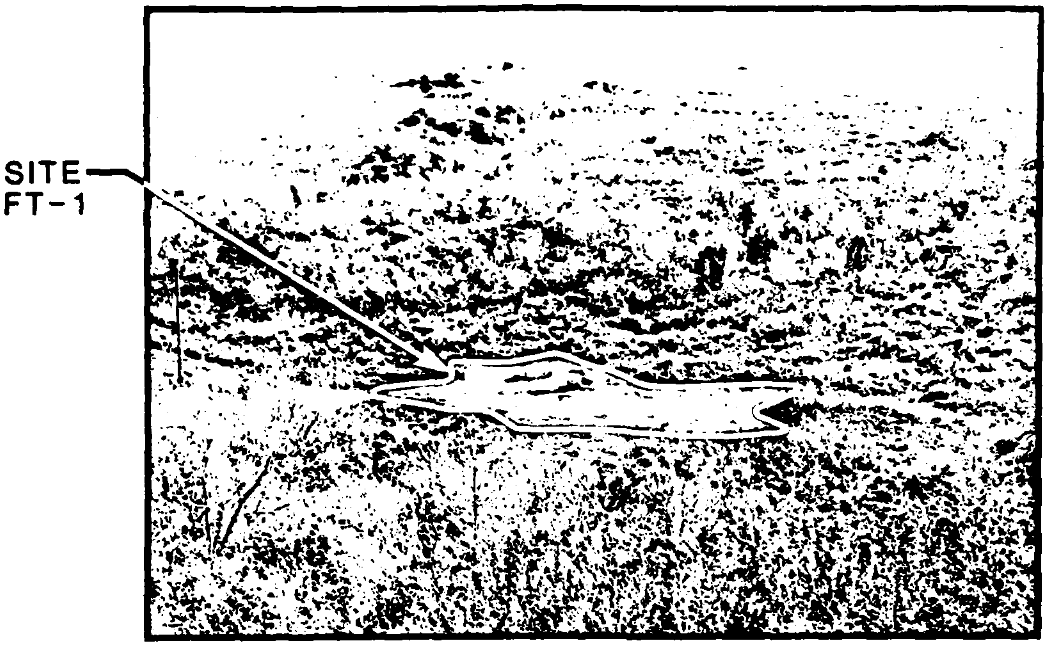
Aerial View (looking southwest)
D-15 POL Sludge Weathering Pit (closed)

SITE D-15

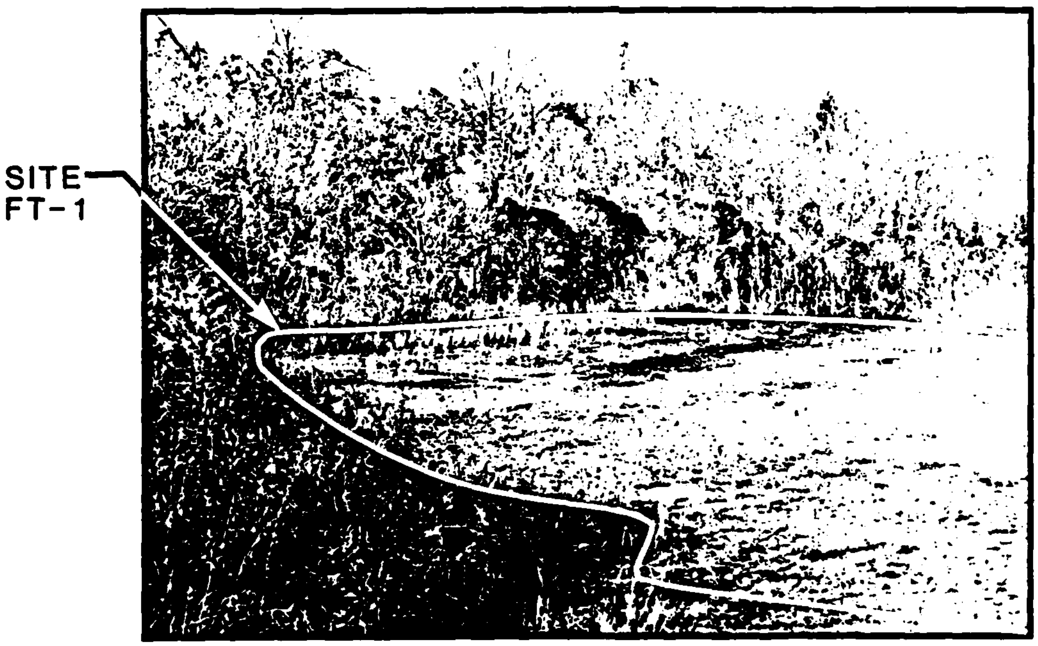


D-15 POL Sludge Weathering Pit (closed)
(looking east)

ENGLAND AFB



Aerial View (looking east)
Site FT-1 Fire Training Site



Site FT-1 Fire Training Site
(looking northwest)

APPENDIX E

HAZARD ASSESSMENT RATING METHODOLOGY

APPENDIX E

USAF INSTALLATION RESTORATION PROGRAM
HAZARD ASSESSMENT RATING METHODOLOGY

BACKGROUND

The Department of Defense (DOD) has established a comprehensive program to identify, evaluate, and control problems associated with past disposal practices at DOD facilities. One of the actions required under this program is to:

> "develop and maintain a priority listing of contaminated installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts." (Reference: DEQPPM 81-5, 11 December 1981).

Accordingly, the United States Air Force (USAF) has sought to establish a system to set priorities for taking further actions at sites based upon information gathered during the Records Search phase of its Installation Restoration Program (IRP).

The first site rating model was developed in June 1981 at a meeting with representatives from USAF Occupational Environmental Health Laboratory (OEHL), Air Force Engineering Services Center (AFESC), Engineering-Science (ES) and CH_2M Hill. The basis for this model was a system developed for EPA by JRB Associates of McLean, Virginia. The JRB model was modified to meet Air Force needs.

After using this model for 6 months at over 20 Air Force installations, certain inadequacies became apparent. Therefore, on January 26 and 27, 1982, representatives of USAF OEHL, AFESC, various major commands, Engineering Science, and CH_2M Hill met to address the inadequacies. The result of the meeting was a new site rating model designed to present a better picture of the hazards posed by sites at Air Force installations. The new rating model described in this presentation is referred to as the Hazard Assessment Rating Methodology.

PURPOSE

The purpose of the site rating model is to provide a relative ranking of sites of suspected contamination from hazardous substances. This model will assist the Air Force in setting priorities for follow-on site investigations and confirmation work under Phase II of IRP.

This rating system is used only after it has been determined that (1) potential for contamination exists (hazardous wastes present in sufficient quantity), and (2) potential for migration exists. A site can be deleted from consideration for rating on either basis.

DESCRIPTION OF MODEL

Like the other hazardous waste site ranking models, the U.S. Air Force's site rating model uses a scoring system to rank sites for priority attention. However, in developing this model, the designers incorporated some special features to meet specific DOD program needs.

The model uses data readily obtained during the Record Search portion (Phase I) of the IRP. Scoring judgments and computations are easily made. In assessing the hazards at a given site, the model develops a score based on the most likely routes of contamination and the worst hazards at the site. Sites are given low scores only if there are clearly no hazards at the site. This approach meshes well with the policy for evaluating and setting restrictions on excess DOD properties.

As with the previous model, this model considers four aspects of the hazard posed by a specific site: the possible receptors of the contamination, the waste and its characteristics, potential pathways for waste contaminant migration, and any efforts to contain the contaminants. Each of these categories contains a number of rating factors that are used in the overall hazard rating.

The receptors category rating is calculated by scoring each factor, multiplying by a factor weighting constant and adding the weighted scores to obtain a total category score.

The pathways category rating is based on evidence of contaminant migration or an evaluation of the highest potential (worst case) for contaminant migration along one of three pathways. If evidence of contaminant migration exists, the category is given a subscore of 80 to 100 points. For indirect evidence, 80 points are assigned and for direct evidence 100 points are assigned. If no evidence is found, the highest score among three possible routes is used. These routes are surface water migration, flooding, and ground-water migration. Evaluation of each route involves factors associated with the particular migration route. The three pathways are evaluated and the highest score among all four of the potential scores is used.

The waste characteristics category is scored in three steps. First, a point rating is assigned based on an assessment of the waste quantity and the hazard (worst case) associated with the site. The level of confidence in the information is also factored into the assessment. Next, the score is multiplied by a waste persistence factor, which acts to reduce the score if the waste is not very persistent. Finally, the score is further modified by the physical state of the waste. Liquid wastes receive the maximum score, while scores for sludges and solids are reduced.

The scores for each of the three categories are then added together and normalized to a maximum possible score of 100. Then the waste management practice category is scored. Sites at which there is no containment are not reduced in score. Scores for sites with limited containment can be reduced by 5 percent. If a site is contained and well managed, its score can be reduced by 90 percent. The final site score is calculated by applying the waste managment practices category factor to the sum of the scores for the other three categories.

FIGURE 1

HAZARD ASSESSMENT RATING METHODOLOGY FLOW CHART

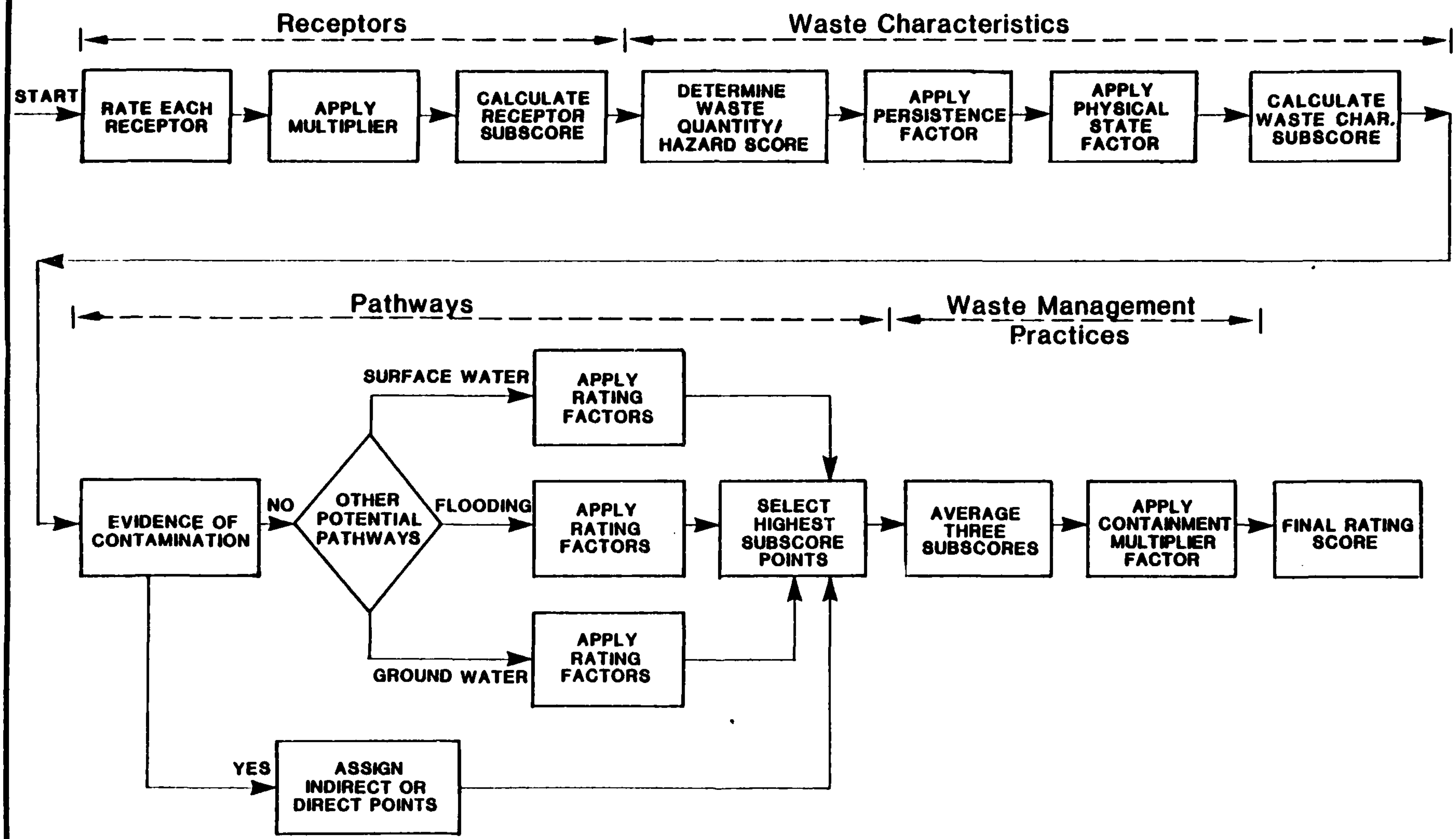


FIGURE 2

HAZARD ASSESSMENT RATING METHODOLOGY FORM

NAME OF SITE ____________________

LOCATION ____________________

DATE OF OPERATION OR OCCURRENCE ____________________

OWNER/OPERATOR ____________________

COMMENTS/DESCRIPTION ____________________

SITE RATED BY ____________________

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site		4		
B. Distance to nearest well		10		
C. Land use/zoning within 1 mile radius		3		
D. Distance to reservation boundary		6		
E. Critical environments within 1 mile radius of site		10		
F. Water quality of nearest surface water body		6		
G. Ground water use of uppermost aquifer		9		
H. Population served by surface water supply within 3 miles downstream of site		6		
I. Population served by ground-water supply within 3 miles of site		6		
		Subtotals	____	____

Receptors subscore (100 X factor score subtotal/maximum score subtotal) ____

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) ____
2. Confidence level (C = confirmed, S = suspected) ____
3. Hazard rating (H = high, M = medium, L = low) ____

Factor Subscore A (from 20 to 100 based on factor score matrix) ____

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

____ X ____ = ____

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

____ X ____ = ____

FIGURE 2 (Continued)

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore ______

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water		8		
Net precipitation		6		
Surface erosion		8		
Surface permeability		6		
Rainfall intensity		8		

Subtotals ______ ______

Subscore (100 X factor score subtotal/maximum score subtotal) ______

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding		1		

Subscore (100 x factor score/3) ______

3. Ground-water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to ground water		8		
Net precipitation		6		
Soil permeability		8		
Subsurface flows		8		
Direct access to ground water		8		

Subtotals ______ ______

Subscore (100 x factor score subtotal/maximum score subtotal) ______

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore ______

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors ______
Waste Characteristics ______
Pathways ______

Total ______ divided by 3 = ______
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

______ X ______ = ______

TABLE 1

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

I. RECEPTORS CATEGORY

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
A. Population within 1,000 feet (includes on-base facilities)	0	1 - 25	26 - 100	Greater than 100	4
B. Distance to nearest water well	Greater than 3 miles	1 to 3 miles	3,001 feet to 1 mile	0 to 3,000 feet	10
C. Land Use/Zoning (within 1 mile radius)	Completely remote (zoning not applicable)	Agricultural	Commercial or industrial	Residential	3
D. Distance to installation boundary	Greater than 2 miles	1 to 2 miles	1,001 feet to 1 mile	0 to 1,000 feet	6
E. Critical environments (within 1 mile radius)	Not a critical environment	Natural areas	Pristine natural areas; minor wetlands; preserved areas; presence of economically important natural resources susceptible to contamination.	Major habitat of an endangered or threatened species; presence of recharge area; major wetlands.	10
F. Water quality/use designation of nearest surface water body	Agricultural or industrial use.	Recreation, propagation and management of fish and wildlife.	Shellfish propagation and harvesting.	Potable water supplies	6
G. Ground-Water use of uppermost aquifer	Not used, other sources readily available.	Commercial, industrial, or irrigation, very limited other water sources.	Drinking water, municipal water available.	Drinking water, no municipal water available; commercial, industrial, or irrigation, no other water source available.	9
H. Population served by surface water supplies within 3 miles downstream of site	0	1 - 50	51 - 1,000	Greater than 1,000	6
I. Population served by aquifer supplies within 3 miles of site	0	1 - 50	51 - 1,000	Greater than 1, 000	6

TABLE 1 (Continued)

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

II. WASTE CHARACTERISTICS

A-1 Hazardous Waste Quantity

S = Small quantity (<5 tons or 20 drums of liquid)
M = Moderate quantity (5 to 20 tons or 21 to 85 drums of liquid)
L = Large quantity (>20 tons or 85 drums of liquid)

A-2 Confidence Level of Information

C = Confirmed confidence level (minimum criteria below)

- o Verbal reports from interviewer (at least 2) or written information from the records.
- o Knowledge of types and quantities of wastes generated by shops and other areas on base.
- o Based on the above, a determination of the types and quantities of waste disposed of at the site.

S = Suspected confidence level

- o No verbal reports or conflicting verbal reports and no written information from the records.
- o Logic based on a knowledge of the types and quantities of hazardous wastes generated at the base, and a history of past waste disposal practices indicate that these wastes were disposed of at a site.

A-3 Hazard Rating

Hazard Category	Rating Scale Levels 0	1	2	3
Toxicity	Sax's Level 0	Sax's Level 1	Sax's Level 2	Sax's Level 3
Ignitability	Flash point greater than 200°F	Flash point at 140°F to 200°F	Flash point at 80°F to 140°F	Flash point less than 80°F
Radioactivity	At or below background levels	1 to 3 times background levels	3 to 5 times background levels	Over 5 times background levels

Use the highest individual rating based on toxicity, ignitability and radioactivity and determine the hazard rating.

Hazard Rating	Points
High (H)	3
Medium (M)	2
Low (L)	1

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

II. WASTE CHARACTERISTICS (Continued)

Waste Characteristics Matrix

Point Rating	Hazardous Waste Quantity	Confidence Level of Information	Hazard Rating
100	L	C	H
80	L	C	M
	M	C	H
70	L	S	H
60	S	C	H
	M	C	M
50	L	S	M
	L	C	L
	M	S	H
	S	C	M
40	S	S	H
	M	S	M
	M	C	L
	L	S	L
30	S	C	L
	M	S	L
	S	S	M
20	S	S	L

Notes:
For a site with more than one hazardous waste, the waste quantities may be added using the following rules:
Confidence Level
- o Confirmed confidence levels (C) can be added
- o Suspected confidence levels (S) can be added
- o Confirmed confidence levels cannot be added with *suspected confidence levels*

Waste Hazard Rating
- o Wastes with the same hazard rating can be added
- o Wastes with different hazard ratings can only be added in a downgrade mode, e.g., MCM + SCH = LCM if the total quantity is greater than 20 tons.

Example: Several wastes may be present at a site, each having an MCM designation (60 points). By adding the quantities of each waste, the designation may change to LCM (80 points). In this case, the correct point rating for the waste is 80.

B. Persistence Multiplier for Point Rating

Persistence Criteria	Multiply Point Rating From Part A by the Following
Metals, polycyclic compounds, and halogenated hydrocarbons	1.0
Substituted and other ring compounds	0.9
Straight chain hydrocarbons	0.8
Easily biodegradable compounds	0.4

C. Physical State Multiplier

Physical State	Multiply Point Total From Parts A and B by the Following
Liquid	1.0
Sludge	0.75
Solid	0.50

TABLE 1 (Continued)

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

III. PATHWAYS CATEGORY

A. Evidence of Contamination

Direct evidence is obtained from laboratory analyses of hazardous contaminants present above natural background levels in surface water, ground water, or air. Evidence should confirm that the source of contamination is the site being evaluated.

Indirect evidence might be from visual observation (i.e., leachate), vegetation stress, sludge deposits, presence of taste and odors in drinking water, or reported discharges that cannot be directly confirmed as resulting from the site, but the site is greatly suspected of being a source of contamination.

Rating Factor	Rating Scale Levels 0	1	2	3	Multiplier
B-1 POTENTIAL FOR SURFACE WATER CONTAMINATION					
Distance to nearest surface water (includes drainage ditches and storm sewers)	Greater than 1 mile	2,001 feet to 1 mile	501 feet to 2,000 feet	0 to 500 feet	8
Net precipitation	Less than -10 in.	-10 to + 5 in.	+5 to +20 in.	Greater than +20 in.	6
Surface erosion	None	Slight	Moderate	Severe	8
Surface permeability	0% to 15% clay ($>10^{-2}$ cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	Greater than 50% clay ($<10^{-6}$ cm/sec)	6
Rainfall intensity based on 1 year 24-hr rainfall	<1.0 inch	1.0-2.0 inches	2.1-3.0 inches	>3.0 inches	8
B-2 POTENTIAL FOR FLOODING					
Floodplain	Beyond 100-year floodplain	In 25-year flood-plain	In 10-year flood-plain	Floods annually	1
B-3 POTENTIAL FOR GROUND-WATER CONTAMINATION					
Depth to ground water	Greater than 500 ft	50 to 500 feet	11 to 50 feet	0 to 10 feet	8
Net precipitation	Less than -10 in.	-10 to +5 in.	+5 to +20 in.	Greater than +20 in.	6
Soil permeability	Greater than 50% clay ($>10^{-6}$ cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	0% to 15% clay ($<10^{-2}$ cm/sec)	8
Subsurface flows	Bottom of site greater than 5 feet above high ground-water level	Bottom of site occasionally submerged	Bottom of site frequently submerged	Bottom of site located below mean ground-water level	8
Direct access to ground water (through faults, fractures, faulty well casings subsidence fissures, etc..	No evidence of risk	Low risk	Moderate risk	High risk	8

TABLE 1 (Continued)

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

IV. WASTE MANAGEMENT PRACTICES CATEGORY

A. This category adjusts the total risk as determined from the receptors, pathways, and waste characteristics categories for waste management practices and engineering controls designed to reduce this risk. The total risk is determined by first averaging the receptors, pathways, and waste characteristics subscores.

B. WASTE MANAGEMENT PRACTICES FACTOR

The following multipliers are then applied to the total risk points (from A):

Waste Management Practice	Multiplier
No containment	1.0
Limited containment	0.95
Fully contained and in full compliance	0.10

Guidelines for fully contained:

Landfills:

- o Clay cap or other impermeable cover
- o Leachate collection system
- o Liners in good condition
- o Adequate monitoring wells

Spills:

- o Quick spill cleanup action taken
- o Contaminated soil removed
- o Soil and/or water samples confirm total cleanup of the spill

Surface Impoundments:

- o Liners in good condition
- o Sound dikes and adequate freeboard
- o Adequate monitoring wells

Fire Proection Training Areas:

- o Concrete surface and berms
- o Oil/water separator for pretreatment of runoff
- o Effluent from oil/water separator to treatment plant

General Note: If data are not available or known to be complete the factor ratings under items I-A through I, III-B-1 or III-B-3, then leave blank for calculation of factor score and maximum possible score.

APPENDIX F

SITE ASSESSMENT RATING FORMS

TABLE OF CONTENTS

HAZARD ASSESSMENT RATING METHODOLOGY

HAZARD ASSESSMENT RATING METHODOLOGY FORM

NAME OF SITE FT-1 FIRE TRAINING SITE NO. 1

LOCATION Near Building 3005

DATE OF OPERATION OR OCCURRENCE 1940's - 1964

OWNER/OPERATOR England AFB

COMMENTS/DESCRIPTION

SITE RATED BY [illegible]

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	1	3	3	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	1	9	9	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	74	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 41

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) M
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 80

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

80 x 0.9 = 72

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

72 x 1.0 = 72

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore ______

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	1	8	8	24
Net precipitation	3	6	18	18
Surface erosion	2	8	16	24
Surface permeability	2	6	12	18
Rainfall intensity	3	8	24	24
		Subtotals	78	108

Subscore (100 X factor score subtotal/maximum score subtotal) 72

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding	0	1	0	3

Subscore (100 x factor score/3) 0

3. Ground-water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to ground water	3	8	24	24
Net precipitation	3	6	18	18
Soil permeability	1	8	8	24
Subsurface flows	1	8	8	24
Direct access to ground water	1	8	8	24
		Subtotals	66	114

Subscore (100 x factor score subtotal/maximum score subtotal) 58

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 72

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	41
Waste Characteristics	72
Pathways	72
Total 183 divided by 3 =	61
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

61 x 1.0 = $\boxed{61}$

HAZARD ASSESSMENT RATING METHODOLOGY FORM

NAME OF SITE D-15 POL SLUDGE WEATHERING PIT

LOCATION Near Building 1321

DATE OF OPERATION OR OCCURRENCE 1950's - 1980

OWNER/OPERATOR England AFB

COMMENTS/DESCRIPTION

SITE RATED BY [illegible]

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	1	3	3	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	1	9	9	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	72	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 40

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) M
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 80

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

80 x 0.9 = 72

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

72 x 1.0 = 72

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore ______

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	1	8	8	24
Net precipitation	3	6	18	18
Surface erosion	2	8	16	24
Surface permeability	2	6	12	18
Rainfall intensity	3	8	24	24
		Subtotals	78	108

Subscore (100 X factor score subtotal/maximum score subtotal) 72

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
2. Flooding	0	1	0	3

Subscore (100 x factor score/3) 0

3. Ground-water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to ground water	3	8	24	24
Net precipitation	3	6	18	18
Soil permeability	1	8	8	24
Subsurface flows	1	8	8	24
Direct access to ground water	1	8	8	24
		Subtotals	66	114

Subscore (100 x factor score subtotal/maximum score subtotal) 58

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 72

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors 40
Waste Characteristics 72
Pathways 72

Total 182 divided by 3 = 61
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

61 x 0.95 = 58

HAZARD ASSESSMENT RATING METHODOLOGY FORM

NAME OF SITE SP-4 JP-4 UNDERGROUND LINE LEAK
LOCATION Building 1502
DATE OF OPERATION OR OCCURRENCE 1977 - 1978
OWNER/OPERATOR England AFB
COMMENTS/DESCRIPTION
SITE RATED BY [illegible]

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	3	4	12	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	1	3	3	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	1	9	9	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
Subtotals			86	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 48

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

60 x 0.8 = 48

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

48 x 1.0 = 48

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore NA

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	1	8	8	24
Net precipitation	3	6	18	18
Surface erosion	2	8	16	24
Surface permeability	2	6	12	18
Rainfall intensity	3	8	24	24
Subtotals			78	108

Subscore (100 X factor score subtotal/maximum score subtotal) 72

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding	0	1	0	3

Subscore (100 x factor score/3) 0

3. Ground-water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to ground water	3	8	24	24
Net precipitation	3	6	18	18
Soil permeability	1	8	8	24
Subsurface flows	1	8	8	24
Direct access to ground water	1	8	8	24
Subtotals			66	114

Subscore (100 x factor score subtotal/maximum score subtotal) 58

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 72

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors 48
Waste Characteristics 48
Pathways 72
Total 168 divided by 3 = 56
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

56 x 0.95 = 53

HAZARD ASSESSMENT RATING METHODOLOGY FORM

NAME OF SITE SP-5 JP-4 UNDERGROUND LINE LEAK

LOCATION Near P2624

DATE OF OPERATION OR OCCURRENCE 1981

OWNER/OPERATOR England AFB

COMMENTS/DESCRIPTION

SITE RATED BY [illegible signature]

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	1	3	3	9
D. Distance to reservation boundary	2	6	12	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	1	9	9	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	68	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 38

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

60 x 0.8 = 48

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

48 x 1.0 = 48

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore ______

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	2	8	16	24
Net precipitation.	3	6	18	18
Surface erosion	2	8	16	24
Surface permeability	2	6	12	18
Rainfall intensity	3	8	24	24
		Subtotals	86	108

Subscore (100 X factor score subtotal/maximum score subtotal) 80

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
2. Flooding	0	1	0	3

Subscore (100 x factor score/3) 0

3. Ground-water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to ground water	3	8	24	24
Net precipitation	3	6	18	18
Soil permeability	1	8	8	24
Subsurface flows	1	8	8	24
Direct access to ground water	1	8	8	24
		Subtotals	66	114

Subscore (100 x factor score subtotal/maximum score subtotal) 58

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 80

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	38
Waste Characteristics	48
Pathways	80

Total 166 divided by 3 = 55 Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

55 x 0.95 = 53

HAZARD ASSESSMENT RATING METHODOLOGY FORM

NAME OF SITE FT-3 FIRE TRAINING AREA NO. 3
LOCATION Near Intersection of Taxiways A and B
DATE OF OPERATION OR OCCURRENCE 1966 - 1980
OWNER/OPERATOR England AFB
COMMENTS/DESCRIPTION
SITE RATED BY [illegible]

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	1	3	3	9
D. Distance to reservation boundary	2	6	12	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	1	9	9	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
Subtotals			68	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 38

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) M
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) M

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

60 x 0.8 = 48

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

48 x 1.0 = 48

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore NA

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	1	8	8	24
Net precipitation	3	6	18	18
Surface erosion	2	8	16	24
Surface permeability	2	6	12	18
Rainfall intensity	3	8	24	24
		Subtotals	78	108

Subscore (100 X factor score subtotal/maximum score subtotal) 72

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
2. Flooding	0	1	0	3

Subscore (100 x factor score/3) 0

3. Ground-water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to ground water	3	8	24	24
Net precipitation	3	6	18	18
Soil permeability	1	8	8	24
Subsurface flows	1	8	8	24
Direct access to ground water	1	8	8	24
		Subtotals	66	114

Subscore (100 x factor score subtotal/maximum score subtotal) 58

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 72

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	38
Waste Characteristics	48
Pathways	72
Total 158 divided by 3 =	53
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

53 x 1.0 = 53

HAZARD ASSESSMENT RATING METHODOLOGY FORM

NAME OF SITE SP-3 JP-4 UNDERGROUND LINE LEAK

LOCATION Near Building 3510

DATE OF OPERATION OR OCCURRENCE 1977-1978

OWNER/OPERATOR England AFB

COMMENTS/DESCRIPTION

SITE RATED BY [illegible]

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	3	4	12	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	1	3	3	9
D. Distance to reservation boundary	2	6	12	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	1	9	9	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	80	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 44

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

60 x 0.8 = 48

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

48 x 1.0 = 48

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore ______

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	1	8	8	24
Net precipitation	3	6	18	18
Surface erosion	2	8	16	24
Surface permeability	2	6	12	18
Rainfall intensity	3	8	24	24
		Subtotals	78	108

Subscore (100 X factor score subtotal/maximum score subtotal) 72

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding	0	1	0	3

Subscore (100 x factor score/3) 0

3. Ground-water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to ground water	3	8	24	24
Net precipitation	3	6	18	18
Soil permeability	1	8	8	24
Subsurface flows	1	8	8	24
Direct access to ground water	1	8	8	24
		Subtotals	66	114

Subscore (100 x factor score subtotal/maximum score subtotal) 58

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 72

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors 44
Waste Characteristics 48
Pathways 72
Total 164 divided by 3 = 55
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

55 x 0.95 = 52

HAZARD ASSESSMENT RATING METHODOLOGY FORM

NAME OF SITE SP-2 TANK 1319 JP-4 SPILL

LOCATION Tank 1319

DATE OF OPERATION OR OCCURRENCE 1969

OWNER/OPERATOR England AFB

COMMENTS/DESCRIPTION

SITE RATED BY [illegible]

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	1	3	3	9
D. Distance to reservation boundary	2	6	12	18
E. Critical environments within 1 mile radius of site	1	10	10	10
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	1	9	9	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	68	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 38

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) L
2. Confidence level (C = confirmed, S = suspected) S
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 70

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

70 x 0.8 = 56

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

56 x 1.0 = 56

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore NA

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	1	8	8	24
Net precipitation	3	6	18	18
Surface erosion	2	8	16	24
Surface permeability	2	6	12	18
Rainfall intensity	3	8	24	24
		Subtotals	78	108

Subscore (100 X factor score subtotal/maximum score subtotal) 72

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding	0	1	0	3

Subscore (100 x factor score/3) 0

3. Ground-water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to ground water	3	8	24	24
Net precipitation	3	6	18	18
Soil permeability	1	8	8	24
Subsurface flows	1	8	8	24
Direct access to ground water	1	8	8	24
		Subtotals	66	114

Subscore (100 x factor score subtotal/maximum score subtotal) 58

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 72

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	38
Waste Characteristics	56
Pathways	72
Total 166 divided by 3 =	55
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

55 x 0.95 = 52

HAZARD ASSESSMENT RATING METHODOLOGY FORM

NAME OF SITE SITE NO. S-1, WASTE OIL STORAGE TANK

LOCATION Horse Stable Area

DATE OF OPERATION OR OCCURRENCE 1965 - mid-1970's

OWNER/OPERATOR England AFB

COMMENTS/DESCRIPTION

SITE RATED BY W. G. Christopher

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	3	4	12	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	1	3	3	9
D. Distance to reservation boundary	2	6	12	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	1	9	9	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	80	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 44

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) S
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 40

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

40 x 0.8 = 32

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

32 x 1 = 32

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore ______

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	3	8	24	24
Net precipitation	3	6	18	18
Surface erosion	2	8	16	24
Surface permeability	2	6	12	18
Rainfall intensity	3	8	18	24
		Subtotals	88	108

Subscore (100 X factor score subtotal/maximum score subtotal) 81

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
2. Flooding	0	1	0	0

Subscore (100 x factor score/3) 0

3. Ground-water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to ground water	3	8	24	24
Net precipitation	3	6	18	18
Soil permeability	1	8	8	24
Subsurface flows	1	8	8	24
Direct access to ground water	1	8	8	24
		Subtotals	66	114

Subscore (100 x factor score subtotal/maximum score subtotal) 58

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 81

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors 44
Waste Characteristics 40
Pathways 81
Total 165 divided by 3 = 55
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

55 x 0.95 = 52

HAZARD ASSESSMENT RATING METHODOLOGY FORM

NAME OF SITE D-3 GENERAL REFUSE DISPOSAL SITE

LOCATION Near Texas & Pacific RR Spur

DATE OF OPERATION OR OCCURRENCE 1950's

OWNER/OPERATOR England AFB

COMMENTS/DESCRIPTION

SITE RATED BY [illegible]

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	1	3	3	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	1	9	9	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	74	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 41

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) S
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 40

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

40 x 1 = 40

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

40 x 1 = 40

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore NA

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	2	8	16	24
Net precipitation	3	6	18	18
Surface erosion	2	8	16	24
Surface permeability	2	6	12	18
Rainfall intensity	3	8	24	24
		Subtotals	86	108

Subscore (100 X factor score subtotal/maximum score subtotal) 80

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding	0	1	0	3

Subscore (100 x factor score/3) 0

3. Ground-water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to ground water	3	8	24	24
Net precipitation	3	6	18	18
Soil permeability	1	8	8	24
Subsurface flows	1	8	8	24
Direct access to ground water	1	8	8	24
		Subtotals	66	114

Subscore (100 x factor score subtotal/maximum score subtotal) 58

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above. 80

Pathways Subscore ______

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	41
Waste Characteristics	40
Pathways	80
Total 161 divided by 3 =	54
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

54 x 0.95 = 51

HAZARD ASSESSMENT RATING METHODOLOGY FORM

NAME OF SITE D-8 CHLORINE GAS CYLINDER DISPOSAL SITE

LOCATION Near Sewage Treatment Pond

DATE OF OPERATION OR OCCURRENCE Early 1960's

OWNER/OPERATOR England AFB

COMMENTS/DESCRIPTION

SITE RATED BY [illegible signature]

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	NA	10	NA	NA
C. Land use/zoning within 1 mile radius	1	3	3	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	NA	6	NA	NA
G. Ground water use of uppermost aquifer	NA	9	NA	NA
H. Population served by surface water supply within 3 miles downstream of site	NA	6	NA	NA
I. Population served by ground-water supply within 3 miles of site	NA	6	NA	NA
		Subtotals	31	69

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 45

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

60 x 1 = 60

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

60 x 1 = 60

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore NA

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	NA	8	NA	NA
Net precipitation	NA	6	NA	NA
Surface erosion	NA	8	NA	NA
Surface permeability	NA	6	NA	NA
Rainfall intensity	NA	8	NA	NA
		Subtotals	NA	NA

Subscore (100 X factor score subtotal/maximum score subtotal) NA

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding	NA	1	NA	NA

Subscore (100 x factor score/3) NA

3. Ground-water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to ground water	NA	8	NA	NA
Net precipitation	NA	6	NA	NA
Soil permeability	NA	8	NA	NA
Subsurface flows	NA	8	NA	NA
Direct access to ground water	NA	8	NA	NA
		Subtotals	NA	NA

Subscore (100 x factor score subtotal/maximum score subtotal) NA

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore NA

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors 45
Waste Characteristics 60
Pathways ~~NA~~

Total 105 divided by 2 = 105
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

53 x 0.95 = 50

HAZARD ASSESSMENT RATING METHODOLOGY FORM

NAME OF SITE D-10 HAZARDOUS CHEMICAL BURIAL MOUND

LOCATION Near Taxiway J

DATE OF OPERATION OR OCCURRENCE 1945 - 1946

OWNER/OPERATOR England AFB

COMMENTS/DESCRIPTION

SITE RATED BY [illegible signature]

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	NA	10	NA	NA
C. Land use/zoning within 1 mile radius	1	3	3	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	NA	6	NA	NA
G. Ground water use of uppermost aquifer	NA	9	NA	NA
H. Population served by surface water supply within 3 miles downstream of site	NA	6	NA	NA
I. Population served by ground-water supply within 3 miles of site	NA	6	NA	NA
		Subtotals	31	69

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 45

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) L
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

60 x 1 = 60

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

60 x 1 = 60

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign *maximum factor* subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore NA

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	NA	8	NA	NA
Net precipitation	NA	6	NA	NA
Surface erosion	NA	8	NA	NA
Surface permeability	NA	6	NA	NA
Rainfall intensity	NA	8	NA	NA
		Subtotals	NA	NA

Subscore (100 X factor score subtotal/maximum score subtotal) NA

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding	NA	1	NA	NA

Subscore (100 x factor score/3) NA

3. Ground-water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to ground water	NA	8	NA	NA
Net precipitation	NA	6	NA	NA
Soil permeability	NA	8	NA	NA
Subsurface flows	NA	8	NA	NA
Direct access to ground water	NA	8	NA	NA
		Subtotals	NA	NA

Subscore (100 x factor score subtotal/maximum score subtotal) NA

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore NA

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors 45
Waste Characteristics ~~60~~
Pathways NA
Total 105 divided by 2 = 53
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

53 x 0.95 = 50

HAZARD ASSESSMENT RATING METHODOLOGY FORM

NAME OF SITE FT-2 FIRE TRAINING SITE NO. 2

LOCATION Near Intersection of Taxiways A and B

DATE OF OPERATION OR OCCURRENCE 1964-1966

OWNER/OPERATOR England AFB

COMMENTS/DESCRIPTION

SITE RATED BY [illegible]

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	4	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	1	3	3	9
D. Distance to reservation boundary	2	6	12	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	1	9	9	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	72	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 40

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) M

Factor Subscore A (from 20 to 100 based on factor score matrix) 50

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

50 x 0.8 = 42

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

42 x 1.0 = 42

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore ______

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	1	8	8	24
Net precipitation	3	6	18	18
Surface erosion	2	8	16	24
Surface permeability	2	6	12	18
Rainfall intensity	3	8	24	24
		Subtotals	78	108

Subscore (100 X factor score subtotal/maximum score subtotal) 72

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding	0	1	0	3

Subscore (100 x factor score/3) 0

3. Ground-water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to ground water	3	8	24	24
Net precipitation	3	6	18	18
Soil permeability	1	8	8	24
Subsurface flows	1	8	8	24
Direct access to ground water	1	8	8	24
		Subtotals	66	114

Subscore (100 x factor score subtotal/maximum score subtotal) 58

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 72

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	40
Waste Characteristics	42
Pathways	72
Total 154 divided by 3 =	52 Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

51 x 0.95 = 48

HAZARD ASSESSMENT RATING METHODOLOGY FORM

NAME OF SITE Site No. S-6 Lake Charles Drum Storage Site
LOCATION Lake Charles Air Force Station Storage Area
DATE OF OPERATION OR OCCURRENCE ??? - Present
OWNER/OPERATOR England AFB
COMMENTS/DESCRIPTION
SITE RATED BY W. G. Christopher

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	2	4	8	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	1	3	3	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	1	9	9	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	102	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 57

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) S
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 40

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

40 x 1 = 40

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

40 x 1 = 40

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. *If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.*

Subscore ______

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	0	8	0	24
Net precipitation	3	6	18	18
Surface erosion	2	8	16	24
Surface permeability	2	6	12	18
Rainfall intensity	3	8	18	24
		Subtotals	64	108

Subscore (100 X factor score subtotal/maximum score subtotal) 59

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding		1		

Subscore (100 x factor score/3) ______

3. Ground-water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to ground water	2	8	16	24
Net precipitation	3	6	18	18
Soil permeability	1	8	8	24
Subsurface flows	1	8	8	24
Direct access to ground water	1	8	8	24
		Subtotals	58	114

Subscore (100 x factor score subtotal/maximum score subtotal) 51

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 59

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors 57
Waste Characteristics 40
Pathways 59

Total 156 divided by 3 = 52 Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

52 x .95 = 49

HAZARD ASSESSMENT RATING METHODOLOGY FORM

NAME OF SITE FT-4 FIRE TRAINING SITE NO. 4
LOCATION Near Taxiway F
DATE OF OPERATION OR OCCURRENCE 1980 - 1982
OWNER/OPERATOR England AFB
COMMENTS/DESCRIPTION
SITE RATED BY [illegible]

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	2	10	20	30
C. Land use/zoning within 1 mile radius	1	3	3	9
D. Distance to reservation boundary	1	6	6	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	1	9	9	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	72	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 40

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) M

Factor Subscore A (from 20 to 100 based on factor score matrix) 50

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

50 x 0.8 = 42

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

42 x 1.0 = 42

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore NA

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	1	8	8	24
Net precipitation	3	6	18	18
Surface erosion	1	8	8	24
Surface permeability	3	6	18	18
Rainfall intensity	3	8	24	24
		Subtotals	76	108

Subscore (100 X factor score subtotal/maximum score subtotal) 70

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
2. Flooding	0	1	0	3

Subscore (100 x factor score/3) 0

3. Ground-water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to ground water	3	8	24	24
Net precipitation	3	6	18	18
Soil permeability	2	8	16	24
Subsurface flows	1	8	8	24
Direct access to ground water	1	8	8	24
		Subtotals	74	114

Subscore (100 x factor score subtotal/maximum score subtotal) 65

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 70

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	40
Waste Characteristics	42
Pathways	70
Total 152 divided by 3 =	51 Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

51 x 0.95 = 48

HAZARD ASSESSMENT RATING METHODOLOGY FORM

NAME OF SITE D-4 GENERAL REFUSE DISPOSAL SITE

LOCATION Near Sewage Treatment Pond

DATE OF OPERATION OR OCCURRENCE Late 1950's to Early 1960's

OWNER/OPERATOR England AFB

COMMENTS/DESCRIPTION

SITE RATED BY [illegible]

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	1	3	3	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	1	9	9	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	74	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 41

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) S
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 40

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

40 x 1.0 = 40

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

40 x 1.0 = 40

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore ______

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	1	8	8	24
Net precipitation	3	6	18	18
Surface erosion	1	8	8	24
Surface permeability	3	6	18	18
Rainfall intensity	3	8	24	24
Subtotals			76	108

Subscore (100 X factor score subtotal/maximum score subtotal) 70

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding	0	1	0	3

Subscore (100 x factor score/3) 0

3. Ground-water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to ground water	3	8	24	24
Net precipitation	3	6	18	18
Soil permeability	0	8	0	24
Subsurface flows	1	8	8	24
Direct access to ground water	1	8	8	24
Subtotals			58	114

Subscore (100 x factor score subtotal/maximum score subtotal) 51

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 70

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	41
Waste Characteristics	40
Pathways	70
Total 151 divided by 3 =	50
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

50 x 0.95 = 48

HAZARD ASSESSMENT RATING METHODOLOGY FORM

NAME OF SITE D-5 GENERAL REFUSE DISPOSAL SITE

LOCATION Near Munitions Burial Site

DATE OF OPERATION OR OCCURRENCE Early 1960's to Mid 1960's

OWNER/OPERATOR England AFB

COMMENTS/DESCRIPTION

SITE RATED BY [illegible]

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	1	3	3	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	1	9	9	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	74	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 41

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) S
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 40

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

40 x 1.0 = 40

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

40 x 1.0 = 40

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore ______

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	1	8	8	24
Net precipitation	3	6	18	18
Surface erosion	2	8	16	24
Surface permeability	2	6	12	18
Rainfall intensity	3	8	24	24
		Subtotals	78	108

Subscore (100 X factor score subtotal/maximum score subtotal) 72

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding	0	1	0	3

Subscore (100 x factor score/3) 0

3. Ground-water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to ground water	3	8	24	24
Net precipitation	3	6	18	18
Soil permeability	1	8	8	24
Subsurface flows	1	8	8	24
Direct access to ground water	1	8	8	24
		Subtotals	76	114

Subscore (100 x factor score subtotal/maximum score subtotal) 67

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 72

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	41
Waste Characteristics	40
Pathways	72
Total 153 divided by 3 =	51
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

51 x 0.95 = 48

HAZARD ASSESSMENT RATING METHODOLOGY FORM

NAME OF SITE SP-6 CE TANK SPILL

LOCATION Near Building 2611

DATE OF OPERATION OR OCCURRENCE 1970's - 1980's

OWNER/OPERATOR England AFB

COMMENTS/DESCRIPTION

SITE RATED BY [illegible]

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	1	3	3	9
D. Distance to reservation boundary	2	6	12	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	1	9	9	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	68	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 38

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) S
3. Hazard rating (H = high, M = medium, L = low) M

Factor Subscore A (from 20 to 100 based on factor score matrix) 30

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

30 x 0.9 = 27

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

27 x 1.0 = 27

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore ______

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	2	8	16	24
Net precipitation	3	6	18	18
Surface erosion	2	8	16	24
Surface permeability	2	6	12	18
Rainfall intensity	3	8	24	24
		Subtotals	86	108

Subscore (100 X factor score subtotal/maximum score subtotal) ______

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding	0	1	0	3

Subscore (100 x factor score/3) 0

3. Ground-water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to ground water	3	8	24	24
Net precipitation	3	6	18	18
Soil permeability	1	8	8	24
Subsurface flows	1	8	8	24
Direct access to ground water	1	8	8	24
		Subtotals	66	114

Subscore (100 x factor score subtotal/maximum score subtotal) 58

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 80

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors 38
Waste Characteristics 27
Pathways 80
Total 145 divided by 3 = 48
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

48 x .95 = 46

HAZARD ASSESSMENT RATING METHODOLOGY FORM

NAME OF SITE SP-7
LOCATION MOTOR POOL UNDERGROUND TANK LEAK
DATE OF OPERATION OR OCCURRENCE 1976-1977
OWNER/OPERATOR
COMMENTS/DESCRIPTION MOGAS STORAGE TANK
SITE RATED BY W B Christensen

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	3	4	12	
B. Distance to nearest well	1	10	10	
C. Land use/zoning within 1 mile radius	1	3	3	
D. Distance to reservation boundary	2	6	12	
E. Critical environments within 1 mile radius of site	1	10	10	
F. Water quality of nearest surface water body	1	6	6	
G. Ground water use of uppermost aquifer	1	9	9	
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	
I. Population served by ground-water supply within 3 miles of site	3	6	18	
		Subtotals	80	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 44

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) S
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 40

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

40 x 0.8 = 32

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

32 x 1 = 32

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore ______

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	1	8	8	
Net precipitation	3	6	18	
Surface erosion	2	8	16	
Surface permeability	2	6	12	
Rainfall intensity	3	8	24	
		Subtotals	78	108

Subscore (100 X factor score subtotal/maximum score subtotal) 72

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding		1		

Subscore (100 x factor score/3) ______

3. Ground-water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to ground water	3	8	24	
Net precipitation	3	6	18	
Soil permeability	1	8	8	
Subsurface flows	1	8	8	
Direct access to ground water	1	8	8	
		Subtotals	66	114

Subscore (100 x factor score subtotal/maximum score subtotal) 58

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 72

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors 44
Waste Characteristics 32
Pathways 72
Total 148 divided by 3 = 49
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

49 x .95 = $\boxed{46}$

HAZARD ASSESSMENT RATING METHODOLOGY FORM

NAME OF SITE RD-1 LOW-LEVEL RADIOACTIVE WASTE DISPOSAL SITE
LOCATION Near Taxiway J
DATE OF OPERATION OR OCCURRENCE 1957 - 1958
OWNER/OPERATOR England AFB
COMMENTS/DESCRIPTION
SITE RATED BY [illegible]

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	1	3	3	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	1	9	9	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	74	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 41

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) L

Factor Subscore A (from 20 to 100 based on factor score matrix) 30

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

30 x 0.4 = 12

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

12 x 0.5 = 6

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore ______

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	1	8	8	24
Net precipitation	3	6	18	18
Surface erosion	1	8	8	24
Surface permeability	3	6	18	18
Rainfall intensity	3	8	24	24
		Subtotals	76	108

Subscore (100 X factor score subtotal/maximum score subtotal) 70

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
2. Flooding	0	1	0	3

Subscore (100 x factor score/3) 0

3. Ground-water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to ground water	3	8	24	24
Net precipitation	3	6	18	18
Soil permeability	0	8	0	24
Subsurface flows	1	8	8	24
Direct access to ground water	1	8	8	24
		Subtotals	58	114

Subscore (100 x factor score subtotal/maximum score subtotal) 51

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 70

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors 41
Waste Characteristics 6
Pathways 70

Total 117 divided by 3 = 39
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

39 x 0.95 = 37

HAZARD ASSESSMENT RATING METHODOLOGY FORM

NAME OF SITE RD-2 LOW-LEVEL RADIOACTIVE WASTE DISPOSAL SITE

LOCATION Near Sewage Treatment Pond

DATE OF OPERATION OR OCCURRENCE Unknown

OWNER/OPERATOR England AFB

COMMENTS/DESCRIPTION

SITE RATED BY W. G. Christopher

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	1	3	3	9
D. Distance to reservation boundary	2	6	12	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	1	9	9	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	68	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 38

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) S
3. Hazard rating (H = high, M = medium, L = low) L

Factor Subscore A (from 20 to 100 based on factor score matrix) 20

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

20 x 0.4 = 8

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

8 x 0.5 = 4

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore ______

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	1	8	8	24
Net precipitation	3	6	18	18
Surface erosion	1	8	8	24
Surface permeability	3	6	18	18
Rainfall intensity	3	8	24	24
		Subtotals	76	108

Subscore (100 X factor score subtotal/maximum score subtotal) 70

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
2. Flooding	0	1	0	3

Subscore (100 x factor score/3) 0

3. Ground-water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to ground water	3	8	24	24
Net precipitation	3	6	18	18
Soil permeability	0	8	0	24
Subsurface flows	1	8	8	24
Direct access to ground water	1	8	8	24
		Subtotals	58	114

Subscore (100 x factor score subtotal/maximum score subtotal) 51

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 70

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	38
Waste Characteristics	4
Pathways	70
Total 112 divided by 3 =	37
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

37 x 0.95 = 35

APPENDIX G
GLOSSARY OF TERMINOLOGY AND ABBREVIATIONS

APPENDIX G

GLOSSARY OF TERMINOLOGY AND ABBREVIATIONS

ACFT MAINT: Aircraft Maintenance

AF: Air Force

AFFF: Aqueous Film Forming Foam

AFB: Air Force Base

AFR: Air Force Regulation

AFSC: Air Force Systems Command

Ag: Chemical symbol for silver

AGE: Aerospace Ground Equipment

AGM: Air-to-Ground Missile

Al: Chemical symbol for aluminum

ALLUVIUM: Unconsolidated sediments deposited in relatively recent geologic time by the action of water.

ARTESIAN: Ground water contained under hydrostatic pressure

AQUICLUDE: Poorly permeable formation that impedes ground-water movement and does not yield water to a well or spring

AQUIFER: A geologic formation, group of formations, or part of a formation that is capable of yielding water to a well or spring

AQUITARD: A soils formation which impedes ground-water flow

AVGAS: Aviation Gasoline

Ba: Chemical symbol for barium

BES: Bioenvironmental Engineering Services

Tendency of elements or compounds to accumulate or build up in the tissues of living organisms when they are exposed to these elements in their environments, e.g., heavy metals

CARBON REMOVER: A material containing approximately 15 percent butyl cellu-solve and 10 percent monoethanol amine and 75 percent petroleum distillates

Cd: Chemical symbol for cadmium

CE: Civil Engineering

CERCLA: Comprehensive Environmental Response, Compensation and Liability Act

CES: Civil Engineering Squadron

CLOSURE: The completion of a set of rigidly defined functions for a hazardous waste facility no longer in operation

COD: Chemical Oxygen Demand, a measure of the amount of oxygen required to oxidize organic and oxidizable inorganic compounds in water

COE: Corps of Engineers

CONFINED AQUIFER: An aquifer bounded above and below by impermeable beds or by beds of distinctly lower permeability than that of the aquifer itself

CONTAMINATION: The degradation of natural water quality to the extent that its usefulness is impaired; there is no implication of any specific limits since the degree of permissible contamination depends upon the intended end use or uses of the water

Cr: Chemical symbol for chromium

Cu: Chemical symbol for copper

D: Disposal Site

DET: Detachment

DISPOSAL FACILITY: A facility or part of a facility at which hazardous waste is intentionally placed into or on land or water, and at which waste will remain after closure

DISPOSAL OF HAZARDOUS WASTE: The discharge, deposit, injection, dumping, spilling, or placing of any hazardous waste into or on land or water so that such waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including ground water

DOD: Department of Defense

DOWNGRADIENT: In the direction of decreasing hydraulic static head; the direction in which ground water flows

DPDO: Defense Property Disposal Office, previously included Redistribution and Marketing (R&M) and Salvage.

DUMP: An uncovered land disposal site where solid and/or liquid wastes are deposited with little or no regard for pollution control or aesthetics; dumps are susceptible to open burning and are exposed to the elements, disease vectors and scavengers

EOD: Explosive Ordnance Disposal

EFFLUENT: A liquid waste discharge from a manufacturing or treatment process, in its natural state, or partially or completely treated, that discharges into the environment

EAFB: England Air Force Base

EPA: U.S. Environmental Protection Agency

EROSION: The wearing away of land surface by wind or water

FAA: Federal Aviation Administration

FACILITY: Any land and appurtenances used for the treatment, storage and/or disposal of hazardous wastes

Fe: Chemical symbol for iron

FLOOD PLAIN: The lowland and relatively flat areas adjoining inland and coastal areas of the mainland and off-shore islands, including, at a minimum, areas subject to a one percent or greater chance of flooding in any given year

FLOW PATH: The direction or movement of ground water and any contaminants that may be contained therein, as governed principally by the hydraulic gradient

FT: Fire Training

FTA: Fire Training Area

GEOSYNCLINE: A large scale basin formed by crystal deformations in which substantial thickenesses of sediments accumulated

GROUND WATER: Water beneath the land surface that is under atmospheric or artesian pressure

GROUND WATER RESERVOIR: The earth materials and the intervening open spaces that contain ground water

HALF-LIFE: The time required for half the atoms present in radioactive substance to decay

HARDFILL: Disposal sites receiving construction debris, wood, miscellaneous spoil material

HARM: Hazard Assessment Rating Methodology

HAZARDOUS WASTE: A solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical or infectious characteristics may cause or significantly contribute to an increase in mortality or an increase in serious, irreversible, or incapacitating reversible illness; or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed (RCRA)

HAZARDOUS WASTE GENERATION: The act or process of producing a hazardous waste

HEAVY METALS: Metallic elements, including the transition series, which include many elements required for plant and animal nutrition in trace concentrations but which become toxic at higher concentrations

Hg: Chemical symbol for mercury

HQ: Headquarters

HWMF: Hazardous Waste Management Facility

INCOMPATIBLE WASTE: A waste unsuitable for commingling with another waste or material because the commingling might result in generation of extreme heat or pressure, explosion or violent reaction, fire, formation of substances which are shock sensitive, friction sensitive, or otherwise have the potential for reacting violently, formation of toxic dusts, mists, fumes, and gases, volatilization of ignitable or toxic chemicals due to heat generation in such a manner that the likelihood of contamination of ground water or escape of the substance into the environment is increased, any other reaction which might result in not meeting the air, human health, and environmental standard

INFILTRATION: The gradual passing of liquid through matter.

IRP: Installation Restoration Program

JP-4: Jet Fuel

LEACHATE: A solution resulting from the separation or dissolving of soluble or particulate constituents from solid waste or other man-placed medium by percolation of water

LEACHING: The process by which soluble materials in the soil, such as nutrients, pesticide chemicals or contaminants, are washed into a lower layer of soil or are dissolved and carried away by water

LINER: A continous layer of natural or man-made materials beneath or on the sides of a surface impoundment, landfill, or landfill cell which restricts the downward or lateral escape of hazardous waste, hazardous waste constituents or leachate

LOX: Liquid Oxygen

LYSIMETERS: A vacuum operated sampling device used for extracting pore water samples at various depths within the unsaturated zone

MEK: Methyl Ethyl Ketone

MGD: million gallons per day

MOA: Military Operating Area

Mn: Chemical symbol for manganese

MONITORING WELL: A well used to measure ground-water levels and to obtain samples

MSL: Mean Sea Level

MUNITION ITEMS: Munitions or portions of munitions having an explosive potential

MUNITIONS RESIDUE: Non-explosive segments of waste munitions (i.e., bomb casings)

NET PRECIPITATION: The amount of annual precipitation minus annual evaporation.

NGVD: National Geodetic Vertical Datum

Ni: Chemical symbol for nickel

OEHL: Occupational and Environmental Health Laboratory

ORGANIC: Being, containing or relating to carbon compounds, especially in which hydrogen is attached to carbon

O&G: Symbols for oil and grease

Pb: Chemical symbol for lead

PCB: Polychlorinated Biphenyls; highly toxic to aquatic life; they persist in the environment for long period and are biologically accumulative

PERCOLATION: Movement of moisture by gravity or hydrostatic pressure through interstices of unsaturated rock or soil

PERMEABILITY: The rate at which fluids may move through a solid, porous medium.

PD-680: Cleaning solvent, safety solvent, Stoddard solvent, petroleum distillate

pH: Negative logarithm of hydrogen ion concentration; measurement of acids and bases

PL: Public Law

POL: Petroleum, Oils and Lubricants

POLLUTANT: Any introduced gas, liquid or solid that makes a resource unfit for a specific purpose

PRECIPITATION: Rainfall

RCRA: Resource Conservation and Recovery Act

RD: Low-level radioactive waste disposal site

RECHARGE AREA: An area in which water is absorbed that eventually reaches the zone of saturation in one or more aquifers

RECHARGE: The addition of water to the ground-water system by natural or artificial processes

RECON: Reconnaissance

RWDS: Radioactive Waste Disposal Site

S: Storage Site

SANITARY LANDFILL: A land disposal site using an engineered method of disposing solid wastes on land in a way that minimizes environmental hazards

SATURATED ZONE: That part of the earth's crust in which all voids are filled with water

SLUDGE: The solid residue resulting from a manufacturing or wastewater treatment process which also produces a liquid stream

SOLID WASTE: Any garbage, refuse, or sludge from a waste treatment plant, water supply treatment, or air pollution control facility and other discarded material, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining, or agricultural operations and from community activities, but does not include solid or dissolved materials in domestic sewage; solid or dissolved materials in irrigation return flows; industrial discharges which are point source subject to permits under Section 402 of the Federal Water Pollution Control Act, as amended (86 USC 880); or source, special nuclear, or by-product material as defined by the Atomic Energy Act of 1954 (68 USC 923)

SP: Spill Area

SPILL: Any unplanned release or discharge of a hazardous waste onto or into the air, land, or water

STORAGE OF HAZARDOUS WASTE: Containment, either on a temporary basis or for a longer period, in such a manner as not to constitute disposal of such hazardous waste

TAC: Tactical Air Command

TCE: Tetrachloroethylene

TCA: 1,1,1-Tetrachloroethane

TOC: Total Organic Carbon

TOXICITY: The ability of a material to produce injury or disease upon exposure, ingestion, inhalation, or assimilation by a living organism

TRANSMISSIVITY: The rate at which water is transmitted through a unit width under a unit hydraulic gradient

TREATMENT OF HAZARDOUS WASTE: Any method, technique, or process including neutralization designed to change the physical, chemical, or biological character or composition of any hazardous waste so as to neutralize the waste or so as to render the waste nonhazardous

UPGRADIENT: In the direction of increasing hydraulic static head; the direction opposite to the prevailing flow of ground-water

USAF: United States Air Force

WATER TABLE: Surface of a body of unconfined ground water at which the pressure is equal to that of the atmosphere

Zn: Chemical symbol for zinc

APPENDIX H
REFERENCES

APPENDIX H

REFERENCES

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APPENDIX I

LIST OF INTERVIEWEES AND OUTSIDE AGENCY CONTACTS

APPENDIX I
LIST OF INTERVIEWEES AND OUTSIDE AGENCY CONTACTS

	Interviewee	Period of Service
1.	Base Bioenvironmental Engineer	1979-1982
2.	BES Technician (MSgt)	1982-
3.	Disaster Preparedness	1981-
4.	Maintenance Superintendent, CRS	1964-1965 1967-1968 1971-1982
5.	Foreman, Liquid Fuels Distribution System	1966-1982
6.	NCOIC, Battery/Electric Shop	1979-1982
7.	Asst. NCOIC NDI	1981-1982
8.	Asst. Branch Chief, CRS	1969-1982
9.	Asst. Branch Chief, Propulsion	1974-1982
10.	Real Property Office	1952-1959 1965-1982
11.	NCOIC, Quality Control (Fuels)	1982-
12.	Chief Enlisted Manager, EMS	1980-1982
13.	AGE Branch Superintendent	1982-
14.	NCOIC Shop Chief	1981-1982
15.	Chief R&R Shop	1970-1976 1979-1982
16.	NCOIC, Wheel & Tire Shop	1982-
17.	Corrosion Control Shop	1979-1982
18.	Phase Operations Mechanic	1974-1982
19.	Pneudralic Shop Mechanic	1979-1982
20.	Armament Systems Branch Chief	1980-1982
21.	EMS Maintenance Chief	1977-1982
22.	Manager, Auto Hobby Shop	1963-1982
23.	Power Production Mechanic	1950-1982
24.	Ground Support Equipment Mechanic	1950-1982
25.	NCOIC Photo Lab	1982-
26.	Chief Enlisted Manager	1980-1982
27.	Roads & Grounds Superintendent	1951-1982
28.	Chief of Supply	1981-1982
29.	BES Technician	1980-1982
30.	Vehicle Maintenance Officer	1975-1982
31.	Chief of Maintenance	1980-1982
32.	Entomology Shop Foreman	1976-1982
33.	Structural Superintendent	1950-1982
34.	Superintendent of Mechanical Section	1960-1982
35.	Fire Chief	1964-1982
36.	BX Service Station Manager	1967-1982
37.	Chief MSgt Combat Support (Claiborne Range)	1975-1979
38.	DPDO Chief (OSB)	1956-1977
39.	DPDO Chief (OSB)	1977-1982
40.	Heavy Equipment Operator	1968-1970
41.	Heavy Equipment Operator	1975-1982

APPENDIX I
LIST OF INTERVIEWEES AND OUTSIDE AGENCY CONTACTS (Continued)

	Interviewee	Period of Service
42.	Chief Engineer	1963-1979
43.	Navy Construction Officer	1979-1982
44.	NCOIC of Claiborne Range	1977-1982
45.	Explosives Ordnance Disposal Branch Chief	1980-1982
46.	Sanitation Superintendent	1963-1978
47.	BEE Technician (Chief MSgt)	1973-1976
48.	Chief Environmental and Contract Planning	1977-1982

OUTSIDE AGENCY CONTACTS

1. R. J. Kliebert, New Orleans District, U.S. Army Corps of Engineers, Hydrologist, 09 December, 1982. (504/838-2555)

2. Ken Fledderman, Louisiana Division of Water Pollution Control, Baton Rouge, Chemical Engineer, 13 December, 1982. (504/342-1265)

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4. Tom Patterson, Louisiana Hazardous Waste Division, Baton Rouge, Waste Management Specialist, 14 December, 1982. (504/342-1227)

5. Cloyd Laughlin, Centron International Lake Charles Air Force Station, Lake Charles, Site Manager, 14 December, 1982.

6. James E. Rogers, U.S. Geological Survey Water Resources Division Sub-District Office, Alexandria, Hydrologist and Branch Chief, 16 December 1982. (318/473-7988)

7. Charles Smoot, U.S. Geological Survey Water Resources Division Sub-District Office, Alexandria, Hydrologic Technician, 17 December 1982. (318/473-7988)

8. Joseph Despino, Alexandria Municipal Water Department, Alexandria, Superintendent, 16 December 1982. (318/473-1261)

APPENDIX J

INDEX OF REFERENCES TO POTENTIAL CONTAMINATION SOURCES

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INDEX OF REFERENCES TO POTENTIAL CONTAMINATION SOURCES

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